

# POPULAR Computing WEEKLY

35p

21-27 April 1983 Vol 2 No 16

## This Week

### Vic software

Mike Grace looks at another range of games software for the Vic20 including a new version of Star Trek. See page 14.

### Satellite Oscar-9

R Bradford presents a program which enables you to locate satellite Oscar-9. See page 17.

### New releases

Software Editor Graham Taylor presents a round-up of the latest games to come on the market for Dragon, Spectrum, BBC and Commodore 64 on page 42.

### Dragon cam

R Walton explains how to calculate a cam and draw its profile in high-resolution graphics. See page 25.

**★ STAR**  
Searcher on  
Spectrum.  
See page 10.  
**GAME ★**

## News Desk

# Hitch-hikers panic over adventure game dispute

by Graham Taylor

A LEGAL storm is brewing over Supersoft's launch of an adventure game based on *The Hitch-hikers Guide to the Galaxy* for the Commodore 64. Vic20 and Dragon versions of the game are expected to follow in a few weeks, under a licensing deal with Audio-genic.

This is something of a coup for Supersoft, since a large number of software companies have been clamouring for the

rights to produce games based on the highly successful books, radio and tv series.

The Supersoft *Hitch-hiker* game was originally written for the Pet by civil servant Bob Chappell back in 1981. He asked Pan Books for permission to use places and characters from the book in a computer game, and received a letter telling him that he could go

ahead, provided that both Pan and *Hitch-hikers'* author Douglas Adams were credited.

Bob Chappell then sold the game to Supersoft for around £500 worth of microchips and assorted programs — a fraction of the price such a game could now expect to command. Computer games are a multi-million pound business — Atari is reputed to have paid an advance on royalties of more than £15m for the video game rights to *ET*.

However, Columbia Merchandising has signed a contract with Douglas Adams' agent Ed Victor to produce a *Hitch-hikers* film — Douglas Adams is currently in the US writing the film script — and part of the deal included the rights to produce a computer game.

When informed of the Supersoft game, Ed Victor said: "Pan had no right to give approval, and even if they did,

Continued on page 5



Zaphod Beeblebrox from the Hitch-hikers series. Photograph from the BBC.

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Continued on page 38



# BRITAIN'S HOME COMPUTER WEEKLY







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Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

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### Accuracy

*Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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## Editorial

Future trends in the microcomputer industry are never easy to predict. Pundits who regularly forecast what will happen in the next few months or years almost invariably seem to end up with egg on their faces.

American manufacturers, software writers and consumers are waking up to the fact that micros are big business.

Companies like Timex, which have imported British expertise, are developing their own indigenous talents. New low-cost versions of the Texas and Atari machines are already proving popular.

If Britain loses its hardware edge, our programmers will lose the advantage they have built up through long familiarity with the Sinclair, BBC and Dragon micros.

It will still be possible to import micros from the US as soon as they are released, but there will be no UK back-up as there is now.

Ever since Clive Sinclair launched the ZX80 three years ago, Britain has led the world in the field of low-cost microcomputers. This lead is not going to disappear overnight, but it is being eroded quicker than some people might think.

## Next Thursday

Can you fly your plane through the rocks and bombs, and shoot the supply pods and invaders? Find out in *Alpha Fighter*, next week's game for the Vic20 with 3K memory expansion, by A Petts. Also, in *Reviews*, John Scriven looks at a range of BBC educational software and Pythagoras' theorem is shown for the Spectrum.

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## Hitch-hikers dispute

Continued from page 1  
some recompense to Douglas Adams would have to be involved.

"I receive at least one request a week from computer companies who want to use the book, but we have deliberately held off because we didn't want anything launched prematurely — a game could tie in beautifully with the film."

The Editor-in-Chief of Pan Sonny Mehta, is now taking legal advice over the Supersoft game. "I can't say anything except that we are very concerned," he said.



Hitch-hiker, Douglas Adams.

Martin Maynard of Audiogenic confirmed that he planned to produce Vic20 and Dragon *Hitch-hiker* games and commented: "I understand Supersoft has a legal contract, it's a matter for them."

Peter Calver, a partner in Middlesex-based Supersoft, said: "We have no reason to withdraw the cassettes, our solicitor says that there is no reason not to rely on the permission given in the letter."

● As a final twist to the story, Peter Calver and Douglas Adams both went to the same school — Sir Anthony Browne's, Brentwood.

## Atari unhappy with ex-founder

ATARI has taken legal action in the US against its founder Nolan Bushnell to stop him from forming a rival company.

When Bushnell sold Atari to Warner Communications for \$15m in 1976 he agreed not to compete in the video games market until October 1983.

But Bushnell has already sought funding for a new video game venture and recently purchased Vidia, a video game research and development

## Computer companies look to low-cost disc system

MICROCOMPUTER companies are beginning to look for alternatives to cassette-based software as home-taping shows signs of posing a real threat.

One low-cost option is the Hungarian MCD-1 3-inch micro-floppy disc system from BATS-NCI.

This drive, using a unique disc-cassette medium, should be priced at around three-quarters of the typical cost of a 5¼-inch drive.

Following its implementation on the ZX81 by Macronics, the device has been taken up by a number of manufacturers who plan versions for the Dragon, Vic, BBC Model B, Commodore 64, Spectrum TRS-80 and Jupiter Ace.

A single disc system is likely to cost around £200, but a twin-disc unit could cost as little as £300.

Each of the single-sided discs has a storage capacity of 200K with a track density of 100tpi. Disc cassettes cost £4 each.

The major problem the sys-

tem faces is acceptance — there is no established sub-5¼-inch disc standard and the BATS-NCI system, although considerably cheaper, is in competition with the Sony 3½-inch drive.

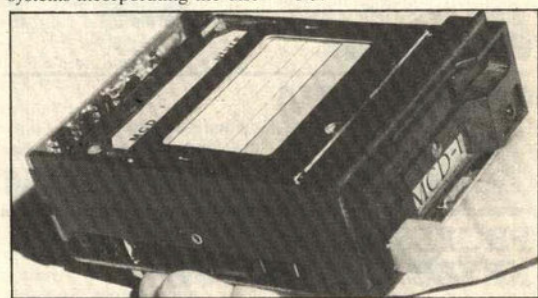
The MCD-1 is clearly intended for home computer application and its future may well depend on the response to it from the software houses.

Another factor is availability — with the exception of the Macronics system — no other versions are likely to appear before the summer.

The companies developing systems incorporating the disc

are: Premier Microsystems, 208 Croydon Road, Anerley, London SE20 (Dragon 32); Cumania, Unit 1, Pines Trading Estate, Broad Street, Guildford, Surrey (BBC and TRS-80); Microprocessor Engineering, 21 Hanley Road, Shirley, Southampton (Dragon 32, Ace, Spectrum); Stein Mittell, 12 Oakthorpe Road, Oxford (Vic20 and Commodore 64); and Eddleman, 10 Trenton Close, Maidstone, Kent (Spectrum).

Details of the MCD-1 from BATS/NCI, Abacus House, 53-55 Ballards Lane, London N3.



## Quicksilver pushes out the packages in one fell swoop

IN one fell swoop Quicksilver has this week launched 14 new titles.

The games are for the Spectrum, ZX81, Vic20, BBC and Dragon 32 computers — and mark a continued diversification of Quicksilver into a whole range of machines. The titles are:

For the 16K Spectrum — *Astroblaster* (£4.95), and *Frenzy* (£4.95). For the 48K Spectrum — *Pixel's Trader* (£9.95) and *Word Processor* (£9.95). For the BBC Models A and B — *The Music Processor* (£14.95). For the BBC

Model B only — *Protector* (£7.95) and *Wizard* (£6.95). For the Vic20 with 3K or 8K expansion — *Skyhawk* (£7.95). For the 16K ZX81 — *3D Black Star* (£4.95), *Damper and Glooper* (£4.95), *Pioneer Trail* (£3.95), *Ocean Trader* (£3.95) and *Cosmic Guerilla* (£3.95).

The launch marks a change of direction for Quicksilver as they become games publishers rather than games writers. All the new releases have been produced by freelance programmers who answered a Quicksilver advertisement

asking for new games.

"We have very definite ideas about where the games market is going," commented Quicksilver's founder, Nick Lambert, "and we are looking forward to becoming a full-time games publishing house."

will hold information accessible by any Micronet subscriber. These pages will show details of machines and software, locations of the stores and news, and availability of new computer systems.

The remaining 50 pages will be used by Spectrum itself. Each dealer will be able to use the system to order stocks from Spectrum and to find out pricing and delivery dates. Using Micronet, Spectrum will be able to communicate directly with any individual store. Intercommunication between stores will also be possible: if one shop is out of stock of a particular item it may be able to find another store who may be able to help.

Each Spectrum store will use a BBC Model B machine together with a Modem supplied by Micronet.

company made up of former Atari engineers.

In filing suit against him Warner Communications claims that these developments, together with public statements by Bushnell claiming that he plans to capture 40 percent of the video games market within four years, violate the spirit of the agreement reached seven years ago.

## Spectrum chain adopts Micronet

THE Spectrum retail chain has concluded a deal with Micronet 800, the Prestel database, to allow people to get information about Spectrum and to link-up its dealers.

Initially, the company will take 100 pages. Fifty of these



# SPECTRUM AND ZX81 HARDWARE



## PANDA

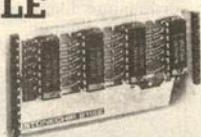
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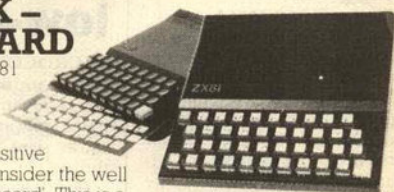
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# LETTERS

## Digging holes

Many thanks to A G Lucas (*Reversing the Charges*, Vol 2 No 11). I had spent some time on Reverse, but had not found the solution to line 240.

I agree that *Dragon's Lair* will Run as printed, but it Runs better if line 220 has the same order of line numbers as line 150. Even so, the game is not what it purports to be — a game for several players — since, as written, successive players do not start with the same lay-out.

First, the random positioning of the "dragons" is inside the player loop. To be the same for each player, the random numbers setting them out must be generated outside this loop:

```
95 E = RND(29)+ 32: F =  
RND(29)+225: G = RND(14)  
+417: H = RND(14)+432 120  
PRINT @E, "d": etc
```

Secondly, any holes "dug" by use of the "D" key are not filled in for subsequent players. A way of correcting this is as follows:

```
70 Add at the end of the line :M =  
@:N = 0  
255 FOR Z = 0 TO 5  
260 IF (DS = "D") AND (Y = 3 + Z *  
4) THEN M = X: N = Y: RE-  
SET(M,N+1): SC = SC+10  
263 NEXT Z  
267 IF X<=M AND Y>N+1 THEN  
SET(M,N+1,1)
```

This allows only one hole to be dug and refilled per 'gallery': if more than one hole is dug, only the most recent is filled in. This is fair, since it puts an extra premium on digging holes — they make it easier for subsequent players!

F Holliman  
7 Pellentine Rd  
Follifoot  
Harrogate  
N Yorks

## Lynx ... 1

Congratulations on being the first magazine I have seen to publish a program for the Lynx. I am a new Lynx owner and am enjoying putting my previous programming experience to the task of discovering some of the many things that the user manual does not mention.

I think other Lynx owners may be interested in my findings and I hope they will pass on their own discoveries.

1) To find whether the left or right arrow is being held down use *Inp &0980* — right arrow returning 233, left arrow returning 251.

2) To find whether the up or down arrow is being held down use *Inp &0080* — up arrow returning 239, down arrow returning 223.

These commands replace *Peeking* the keyboard buffer on other machines and will, unlike *Get* or *Key*, register if a key is held down and not just pressed.

3) Ports *&0086* and *&0087* control the screen position. To scroll the screen upwards use *Out (&0086),12* then *Out (&0087),x* where *x*=the number of lines to be scrolled up. To scroll left, use *Out (&0086),13* then *Out (&0087),x* where *x*=the number of character spaces to be scrolled. *Out (&0087),0* resets the screen.

If anyone knows how to *Peek* the screen to find what is in a character space will they please make it public.

M Swindells  
38 Westbourne Gardens  
Hove  
E Sussex BN3 5PP

## Easy and useful

I am writing in response to the letter published from Ashley Buss (Vol 2 No 13).

I believe Mr Buss would find the following technique both easy and helpful when using *List* while debugging on the Dragon. Using only the thumb and forefinger of the right hand, one should hold down the *Shift* key (thumb), and stop/start the auto-scrolling with the @ and back-space keys.

If both keys are pressed together, the scroll moves up only one line at a time. Again, the shift key should be held down with the thumb, the forefinger 'bridging' the others. I trust Mr Buss will find this technique useful.

F Hart  
6 Siddons Way  
Moulton  
Northants

## Lynx ... 2

Recently, I bought a Lynx. I have been messing about with the monitor and discovered that if you enter the

monitor and type "G BC" — which means execute BC — you will be amazed to find two prompts. You can exit the monitor by pressing J and run a whole program in double vision style.

Alec Chattaway  
170 Lister Avenue  
East Bowling  
Bradford BD4 7QU

## Lynx ... 3

Thank you for publishing Jason Orbaum's article 'A gift from the gods' (Vol 2 No 13) on handling string arrays on the Lynx. In fact, he's wrong when he says 'the Lynx cannot handle string arrays of any sort'. I have been using bubble sorts without having to resort to his complicated sub-routines, admirably clever as they are.

The first command is simply this:

```
Dim XS$(Y)(Z)  
where Y is the maximum  
length in characters of any one  
string, and Z is the maximum  
number of strings to be hand-  
led. It means that the amount  
of memory to be reserved for  
string storage can be specified  
precisely. The following program  
is well worth trying:
```

```
10 ? MEM  
20 DIM XS(30)(420)  
30 ? MEM
```

None of this is mentioned in the Lynx manual.

Paul Davey  
13 Sudeley Street  
Brighton BN2 1HE

## Expensive and mediocre

Speaking from the 'grass roots' level as a micro user, I feel Commodore and John Baxter would do well to reconsider their position on home taping.

As with most other newcomers, I bought my Dragon primarily to learn about programming. The attraction was the sheer versatility of the machine. If I do not like the game/utility, or whatever, I can change it and record my own version. Furthermore, as in any other language, it is a great advantage to study the techniques of other programmers.

With the advent of the inexpensive home micro we have the opportunity to build a whole sub-culture capable of

exploiting the system to its limits. It is a great shame that Commodore do not share this vision.

Again, speaking as a 'user', I feel that most of the programs on offer are expensive and at best mediocre. A simple costing exercise will show there is a huge mark-up on cassette tapes. One gets the impression that the micro industry is more interested in lining their own vaults, than in looking after their customers interests.

Given the opportunity, I would say to John Baxter: "If you cannot exploit the economies of scale and engender customer loyalty by giving sheer value for money, then perhaps it is time you considered some other market place. You may want to sell robots, but your customers ain't!"

Thanks for allowing me to let off steam.

D L George  
33 Victoria Road  
Shoreham-by-Sea  
West Sussex BN4 5LA

## Is it propaganda?

I have been reading your *Imagine* *Popular Computing Weekly* ever since I joined the ranks of microcomputer owners last summer. However, on reading the issue dated 7-13 April 1983, under the heading of "Classified Ads", I find a political CND type advertisement under the name of "Programmers for Peace".

I use a computer for fun. I also buy your publication for that reason. If I require to read CND propaganda I need only pick up a newspaper. I can watch or listen to the same propaganda on television. I can see no need for magazines such as yours to carry such propaganda.

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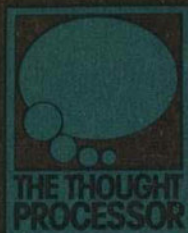
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# Searcher

A new game for the 48K Spectrum by Andrew Filby

This program called *Searcher* has been written mainly in Basic, but I have also used two machine code routines. The first machine code routine scrolls the whole screen from right to left which makes the graphics smooth and fairly fast. The second machine code routine is used to invert the whole screen without clearing it, which contributes to a dramatic explosion effect.

The program was written on a 48K Spectrum, but could be used by a 16K

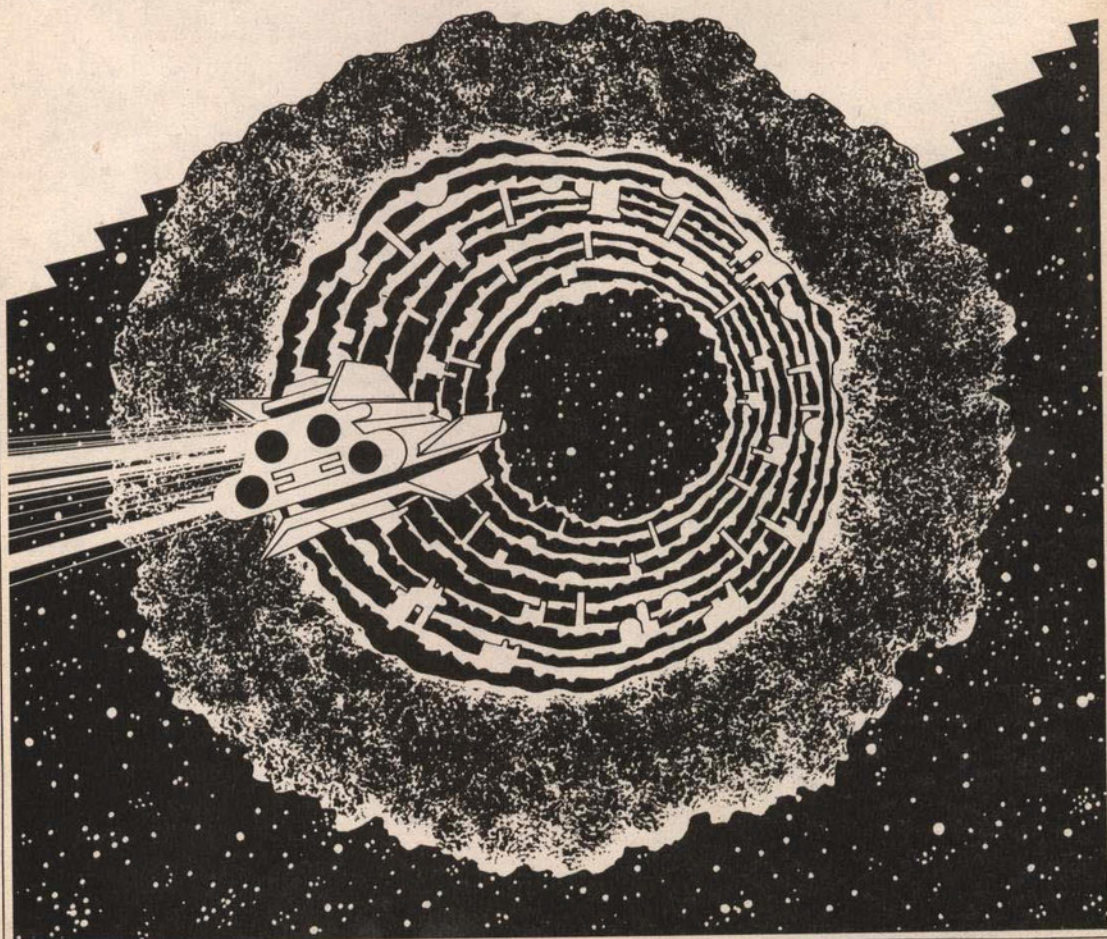
machine by lowering the machine code addresses.

The object of the game is to fly for as long as possible without hitting the aliens or the walls. There are two kinds of alien, one is worth 20 points and the other is worth 40 points. Each wall dodged is worth 50 points.

When you have used your three lives, you are given your score and a message

suggesting how good your score was. Full instructions are included in the program.

The routine at line 4000 is used to find out if an alien has been shot by your laser. This routine enables *Inkeys* to recognise user-defined graphics. The code of the character is stored in the variable *I*.





```

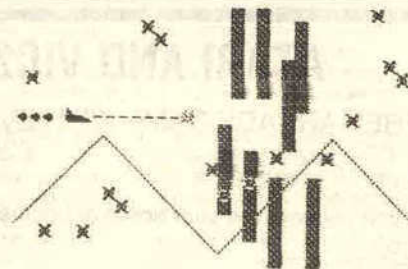
1 REM *****
2 *** S E A R C H E R ***
3 *** @ ANDREW FILEY. ***
4 *****
5 CLEAR 64999: FOR I=65000 TO 65043
6 READ A: POKE F,A:
7 NEXT I
8 FOR F=144 TO 152: FOR G=0 TO 7: READ A: POKE USR CHR$(F+G,A)
9 NEXT G: NEXT F
10 GO SUB 6000
11 LET L=1: LET SC=0: LET X=3:
12 LET Y=10: LET FL=1000: LET H=31
13 BORDER 4: PAPER 4: CLS: LE
14 AS=1: INK 6: PAPER 0: CLS: BQ
15 ROE 0
16 RANDOMIZE: LET A=INT (RND*
17 10)
18 PRINT AT Y,X: INK 2: " "
19 LET A$=INKEY$:
20 IF SC=1000 THEN GO SUB 600
21
22 IF AS=1 AND SC=1000 THEN L
23 ET AS=0: PRINT AT 0,20: "WATCH DO
24 T!"
25 LET SC=SC+1: GO SUB 3000
26 LET F=X+1: PRINT AT Y,X-1:
27 OVER 1: GO SUB 4000: IF I
28 =149 OR I=151 OR I=152 THEN PRIN
29 T AT Y,X: FLASH 1: PAPER 3: INK
30 1: " " FOR F=40 TO -30 STEP -10
31 : BEEP .03,F: LET Z=USR 65025: N
32 EXT F: DEEP .1,-35: LET L=L+1: I
33 F L=4 THEN GO TO 5000
34 GO SUB FL TO 5000
35 INK 2: OVER 1: " " INK L: " "
36 BEEP .004,-10
37 PRINT AT Y,X-1: " "
38 IF AS="6" AND AS="5" AND
39 AS="6" AND AS="7" THEN GO TO 1
40 30
41 PRINT AT Y,X: OVER 1: " "
42 IF AS="7" AND Y=0 THEN LET
43 Y=Y-1
44 IF AS="6" AND Y<21 THEN LET
45 Y=Y+1
46 IF AS="5" AND X<20 THEN LET
47 X=X+1
48 IF AS="5" AND X>1 THEN LET
49 X=X-1
50 PRINT AT Y,X: INK L: OVER 1
51 " "
52 IF AS="9" THEN GO TO 140
53 FOR F=X+2 TO X+11: GO SUB 4
54 000: IF I<149 AND I<152 THEN P
55 RINT AT Y,F: INK 7: OVER 1: " "
56 BEEP .0005,60: NEXT F: GO TO 13
57
58 PRINT AT Y,F: PAPER 2: INK
59 7: " " FOR G=30 TO 0 STEP -10:
60 BEEP .01,0: NEXT G: PRINT AT Y,F
61 OVER 1: " " LET SC=SC+20: IF
62 I=152 THEN LET SC=SC+20
63 FOR G=X+2 TO F-1: PRINT AT
64 Y,G: OVER 1: " " NEXT G
65 GO TO 90
66 PRINT OVER 1: AT H,31: " "
67 LET Z=USR 65000
68 LET H=H-1: IF H=A THEN LET
69 FL=2000: LET A=21: LET H=H+1
70 RETURN
71 GO TO 1010
72 PRINT OVER 1: AT H,31: " "
73 LET Z=USR 65000
74 LET H=H+1: IF H=A THEN LET
75 FL=1000: LET H=H-1: LET A=INT (R
76 ND*10)+10
77 RETURN
78 IF RND<(.5-(L/10)) THEN LET
79 AND=(RND*20)+1: PRINT AT RND,31
80 : "X": FOR F=30 TO 50 STEP 10: BE
81 EP .01,F: NEXT F: IF RND*.7 THEN
82 PRINT AT RND,31: "X"
83 RETURN
84 POKE 23506,PEEK 23575: POKE
85 23507,PEEK 23576-1
86 LET I=CODE SCREEN$(Y,F)+11
87
88 POKE 23506,0: POKE 23507,60
89 RETURN
90 FOR I=0 TO 60 STEP 5: BEEP
91 .005,I: LET Z=USR 65025: NEXT I
92 BORDER 1: PAPER 1: INK 7: C
93 LS: PRINT TAB 13,"SEARCHER" AT
94 0,13: OVER 1: " " Y
95 OU SCORED: FLASH 1,5C: FLASH 0
96 POINTS.
97 IF SC<200 THEN LET A$="CAN
98 YOU RIDE A CYCLE ????"
99 IF SC<200 AND SC<500 THEN L
100 ET A$="I CAN TELL YOU A LEARNER
101 "
102 IF SC<500 AND SC<1500 THEN
103 LET A$="NOT BAD,KEEP TRYING"
104 IF SC<1500 AND SC<2500 THEN
105 LET A$="QUITE GOOD!"
106 IF SC<2500 AND SC<4000 THEN
107 LET A$="BRILLIANT!!!!!"
108 IF SC<4000 THEN LET A$="AMA
109 ZING!! AMAZING!! AMAZING!!"
110 PRINT A$
111 BEEP .5,0: PRINT "PRESS A
112 NY KEY FOR ANOTHER GO": PAUSE 0:
113 RUN

```

```

5000 STOP
5000 RANDOMIZE: IF RND<.5 THEN
5001 RETURN
5005 LET D=INT (RND*16): FOR F=D
5006 TO D+5: PRINT AT F,31: " " NEX
5007 T F
5010 LET SC=SC+50: RETURN
5000 PAPER 7: INK 0: BORDER 7: C
5010 LS
5010 PRINT TAB 13: INK 2: "SEARCH
5011 ER" AT 0,13: OVER 1: " "
5020 PRINT "YOU COMMAND YOUR SHIP
5021 P( ) USING KEYS: -"
5021 PRINT TAB 5: "7 FOR UP ,8 FO
5022 R FORWARD"
5022 PRINT TAB 5: "6 FOR DOWN ,5
5023 FOR BACKWARD"
5023 PRINT TAB 10: "9 FOR FIRE"
5024 PRINT "YOU ARE ALWAYS MOVI
5025 NG FORWARDS SO BEWARE! YOU MUST
5026 TRAVEL AS FAR AS YOU CAN TO C
5027 OLLECT POINTS TO HINDER YOU ALIE
5028 NS(X) APPEAR AT RANDOM. X=20 PO
5029 INTS, A=40 FOR EACH ALIEN SHOT
5030 ,IF YOU CRASH INTO AN ALIEN YOU U
5031 LL BE DELETED"
5032 PRINT "IF YOU REACH 1000 PO
5033 INTS WALLS WILL START TO APPEAR
5034 YOU CANNOT DESTROY A WALL SO YO
5035 U MUST GO AROUND IT,EVERY WALL
5036 DODGED IS WORTH 50 POINTS."
5036 PRINT "YOU MAY GO BELOW THE
5037 HILLS AS YOU MOVE FORWARD."
5038 INPUT "Press ENTER to start
5039 " LINE 35
5040 RETURN
5000 DATA 6,192,17,0,64,213,225,
5001 35,197,1,31,0,25,237,176,43,64,0
5002 ,35,35,19,193,16,240,201,33,0,64
5003 ,8,24,197,8,0,126,238,255,119,35
5004 ,15,249,193,16,245,201
5005 DATA 64,96,112,112,255,127,
5006 255,127
5010 DATA 0,0,0,0,224,240,254,25
5011 5
5020 DATA 128,64,32,16,8,4,2,1
5030 DATA 1,2,4,8,16,32,64,128
5040 DATA 0,0,0,0,6,31,63,126
5050 DATA 195,102,60,90,90,60,10
5051 2,195
5060 DATA 17,68,17,149,0,34,72,1
5070 DATA 239,239,187,187,239,23
5071 9,237,187
5080 DATA 66,36,189,102,60,255,1
5081 29,195

```



#### Variables used :-

F=FOR/NEXT LOOP  
 G=FOR/NEXT LOOP  
 A=HEIGHT OF MOUNTAIN  
 SC=SCORE  
 X=X CO-ORD OF SHIP  
 Y=Y CO-ORD OF SHIP  
 FL=MOUNTAIN GOING UP OR DOWN  
 H=INCREASING/DECREASING HEIGHT  
 OF MOUNTAIN  
 AS=OVER 1000 POINTS?  
 RND=HEIGHT OF NEW ALIEN  
 I=CODE OF USER GRAPHIC  
 Z=CALL OF MACHINE CODE  
 L=LIVES  
 D=RANDOM POSITION OF WALL  
 O=FOR/NEXT LOOP  
 A\$=MESSAGE

#### GRAPHIC CHARACTERS

R=X  
 C=\  
 E=+  
 G=0  
 I=X  
 B=X  
 D=/  
 F=X  
 H=X



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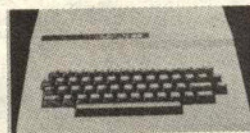
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# Tandy support . . .

**David Kelly talks to John Sayers, managing director of Tandy (UK)**

Last year the Tandy Corporation showed world-wide net sales of over £1.75 billion through over 8,000 retail outlets.

Sales of computers alone are expected to top £500m this year with no sign of the upward trend beginning to slow.

These figures emphasise the scale of the Tandy enterprise. The company sells every conceivable kind of electrical and electronic goods — from metal detectors to music synthesisers. The range of computers extends from small pocket computers up to substantial business systems.

Strange then that the Tandy Corporation began in 1927 in an altogether different industry. Two ambitious men founded the Hinkley-Tandy Leather Company in Fort Worth, Texas. In 1950 the two partners split up, with Charles Tandy concentrating the new Tandy organisation on the leather handicraft business, selling by mail-order and through a growing number of retail outlets. Sales rose quickly to a peak of over £17 million and then began to fall quite dramatically so that in 1955 the company diversified into a range of activities including petroleum and jet-aircraft.

Then, in 1964, the Tandy Corporation acquired an ailing mail-order electronics business called Radio Shack. And the rest, as they say, is history.

Tandy first appeared in the UK 10 years ago — John Sayers, the British company's present managing director, joined the company as a store manager in 1974.

"We opened up in this country in a big way — by the end of the first year we had over 100 stores. The total went up to 120 and in the next three years we lost an enormous amount of money!" he says.

## "Since then we haven't looked back!"

"It wasn't until our first computer, the TRS80 Model 1 4K machine, was introduced in Britain in the autumn of 1978 that we began to make money.

"Since then we haven't looked back — we now have 230 stores."

Included in the number of stores are 24 dedicated computer centres. These outlets deal only with the computer side of the company and offer support to the user.

"We are selling basic computer literacy. The specialist stores do not just sell computers — we offer a comprehensive classroom/tutorial facility and engineering support at our centres.

"Tandy now has a very wide range of computers — from the Tandy Color Computer to our range of pocket computers and our new portable machines, right through to the business machines — the Model 16 and Model 12.

"To support all that, we have a central telephone enquiries service. We can solve 80 percent of enquiries immediately. Another 15 percent we will find out about and phone the user back. For the remaining 5 percent we may have to go to Tandy in the US for the answer. We are quite proud of that service."

Although the TRS-80 Color Computer has been very successful in America, it does not seem to have achieved the same level of success in Britain. The computer and peripherals probably account for only about 18 percent of the company's UK computer sales.

"I suppose that is partly historical. We brought the business machine over before the home machine and consequently we are seen as being more on the business side than we probably are." From Tandy's point of view the business market may well seem more attractive. Certainly, the home computer market is very competitive in the UK with home-grown companies like Sinclair, Dragon and Acorn taking a big slice.

## "We know the Color Computer is good"

"The Tandy Color Computer is a product which we will market aggressively. And we know it is good because already there is a look-alike of it — the Dragon. People are aware that the two computers are similar and Dragon has done us some good in a market in which we haven't advertised heavily. We have cleared a lot of software and we have orders for our CGP-115 four-colour printer/plotter coming out of our ears.

"We offer what is probably the best range of printers. We buy in stocks knowing that we will sell a proportion to owners of other machines. If we ordered stocks on a one to one basis with Color Computers we would never have any peripherals in stock. Obviously I would prefer to sell them to be used on our own machine, but I can't complain. We sold out of our Colour Computers at Christmas.

"It is software that sells the hardware. Although we have some 37 packages for the Color Computer, that is one of the reasons I'm not against the Dragon. They are putting money into software development — it is very much a two-way process and they have done us a lot of good.

"At the moment, our main problem with the Color Computer is price, despite the fact that it is manufactured in Korea. The main currency there is the dollar, so it is extremely difficult to get a good price with the pound being so weak.

"If you say to me: 'Justify your computer against the Dragon', then, on hardware terms alone, I cannot. But in terms of back-up, customer help and servicing I think we offer more support than anyone else. Our staff undergo an intensive training course which extends not just over the



home computer end, but right up to the big business systems like the Model 16. And it is that depth of knowledge and technical expertise that a department store cannot match. People don't want to struggle to learn to program and that's where the back-up is all-important.

Another area in which Tandy is strong is education. Several local education authorities have adopted the TRS-80 for the classroom because the company offers a unique networking system for 16 machines called the Classroom Concept.

"We have a department dedicated to the Classroom Concept run by an ex-headmaster who was a Tandy convert back in 1980. To put one micro in a school is pointless. You would get the best use from it by giving it to the caretaker or the person who plans the timetables rather than putting it in the classroom. That is why our networking system has been so successful — despite the fact that we are not included in the Government Grants scheme.

"Again the most important thing we can offer is back-up support. We offer teachers free tutorials as part of our package."

Computers now represent 36 percent of Tandy (UK)'s business and most of the company's resources are going into new computer stores. Next year Tandy plans to open about 20 new stores, of which 15 will be computer stores. Worldwide, computer products account for 33 percent of sales. This year John Sayers estimates they will break \$1 billion on computers and, as he says, that is a big number.

"In 1978 when the first TRS-80 Model 1 came over, we were all apprehensive about it — none of us anticipated the growth we have seen. At first we had one machine with 4K. Then it went to 16K, then discs. Now we have a 16-bit machine with 512K. I lose track of the numbers.

"We announced that we would be launching five new machines in 1983 and we have now given details of three of these — the new business machine, the Model 12; the pocket computer, the PC4; and the Model 100 portable computer.

"I expect computers to account for over 40 percent of our business in Britain next year — and who knows after that. A lot depends on new products and we have one new product in particular, this year, that will shake things up."



## A bird's eye view . . .

**Mike Grace emerges from the Pharaoh's tomb to test another batch of Vic software**

The sun is shining outside and the thought of digging up a few weeds whilst softly contemplating life in general (a quiet and definite reason for taking up gardening is to shake the microchip mania out of my brain at intervals) is beginning to seem almost attractive. I stare at the slightly thickening clouds on the horizon and decide that it's beginning to look like rain. With a sigh of relief, I sit gently down in front of my Vic and begin to load another cassette, a movement that is becoming as automatic as breathing.

It seems occasionally as though time moves at a different pace when one is sitting at a computer (this is not an original idea of mine as I read a very clever letter in a computer magazine about the theory of relative time and the vicinity of the microchip). Nonetheless, it is true that once I sit down in front of the Vic time seems to fly by in the 'outside' world — in fact, once I rose from a short spell of programming (about 40 minutes I'd estimate) to discover that it was past midnight and the rest of the house was abed. Thus it is when I review the items of software that the editor of *Popular Computing Weekly* sends me.

But enough of this philosophy — back to the games. And let's start with a good 'un this time (looking back over my previous reviews it seems I often begin with the poor items and move up to a climax with the best), a 16K version of *Star Trek*. I'd already reviewed the basic game so when I received another version from Wessexsoft it was with interest that I wondered how it would compare.

Wessexsoft is a 'one-game company' at the moment, run by Douglas Sneddon who sent a very nice and informative letter with the game describing a few points about playing and a little personal history. It took five months to complete the programming (I can well believe it) and the author claims there are several 'extra' touches like a

different service number on the Klingon ships when you destroy them. Having read the letter I sat back and waited for the instructions to load.

For those of you unfamiliar with the *Star Trek* concept, you are in control of the *Enterprise* and your task is to seek out and destroy the Klingons in your sector of space. To do this you must move the ship across various 'Galaxy Maps' and then by pressing a key letter you can view sectors of space to see if a Klingon is nearby. Having found one or more, you may try to destroy them by firing photon torpedoes or phasers — but they can also fire at you.

The last game I played had no graphics. The essence of the game is one of skill in isolating the enemy and then being able to direct your fire by keying in the right co-ordinates — thus it is not a 'wham bam' invaders type but a game of skill which takes place mostly in the imagination. But, Wessexsoft has introduced some excellent graphics, starting right at the beginning with a very neat side view of the *Enterprise* which rises from the bottom of the screen, remains there whilst the titles appear in staccato form below the ship, then slowly descends again prior to the usual request for 'Instructions and Playing Hints'.

### The 'human' touch!

This tremendous effort in the presentation of what is basically just the title of the game (which must have taken many hours of programming alone) is what I have been talking about in previous reviews. To me, presentation of the game is almost as important as the game itself. An excellent game can be spoiled by sloppy graphics (if any) and lack of care, whilst an average game becomes enjoyable if the programmer has obviously taken pains with it. Well, *Star Trek* 16K has extremely professional graphics plus the advantage of already being a good computer game. Wessexsoft has a good start.

After this impressive beginning, there is a series of instructions to read (a few minor mistakes here in spelling and punctuation) — I felt these to be inadequate for the novice player, as some of the rules of the game were not explained clearly enough. Then, we're waiting again whilst the tape continues to load the game into memory. It would be nice to have a facility to bypass the instructions as, once you've played the game a few times, they are no longer necessary.

Being 16K, loading seems to last forever (I do wish a few more software houses would release material on disk for those of

us who do have the 1540). Then suddenly the *Enterprise* flashes back on the screen and a pod moves up to dock in the main ship (presumably we've come up this way as the transporter wasn't fully operational!) and then the game really does start. First instruction is the skill level (1-10) and I pressed 12 to see how well the program would cope with idiots. A very professional error message flashed up (Wessexsoft uses excellent colour messages all through the game) so this time I keyed in 1 (I'm no fool when I start a game) and away we went.

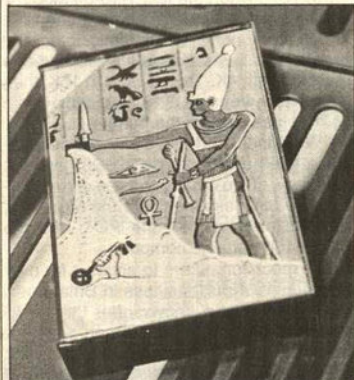
I won't give too much away, but suffice it to say that this version of *Star Trek* is as enjoyable as any other (except that every time you warp there is a short delay whilst the Vic makes the noise of a spaceship taking off, a habit I quickly found wore very thin when I wanted to get on with the game), and I liked the graphics of a Klingon being blasted when I did succeed in destroying one. One feature that the authors have put in is a 'human' touch in that some of the messages are supposed to be either friendly or sarcastic — at the end of one game I was told to report for the 'accidental' destruction of one of my own star bases! I didn't even do it either!

All in all, though, at £9.50, I found this game to be better than many I've seen from the so-called 'professional' houses and I hope Douglas Sneddon starts on another game soon.

Now, I am not a great arcade player (in truth I am not an arcade player at all as I cannot see the sense in dropping money into someone else's machine when I have my Vic at home), so it came as something of a surprise to discover that everyone seemed to be playing (or at least talking about) a game called *Krazy Kong*. In this game you have to climb up various ladders and along girders to rescue a fair damsel who has been captured by Kong, the giant ape who stands expectantly at the top of the screen waiting for you. Meanwhile Kong rolls a limitless supply of barrels at you to try and stop you from reaching the girl. And there are usually other hazards such as falling off a girder to be splatted on the floor.

Anirog's version for the 16K Vic arrived the other day and it looks a whole lot slicker than several versions I saw at a computer exhibition recently. But my first attempts to play the game ended in frustrated failure — I just could not dodge the barrels fast enough to get to the girl (who looks more like a bloke than Fay Wray in this particular version). Persistence won through though, and after about an hour I had at last reached her. I discovered that in Anirog's game there are several screens to work through. The next version is, of course, harder, and you only have two lives instead of three.

It appears there are at least four screens to reach (to date I have only managed three), and the advertisement promises a spectacular collapse of Kong's lair in the







fourth screen. Can't wait! The price of the game is only £7.90 which seems unbelievable to me. The game is worth that price for the graphics alone and there are plenty of extras such as picnic hampers, umbrellas and mallets (to smash barrels and gain extra points). You can use a joystick or keys (though how anyone could work the keys and watch the screen fast enough is beyond me — and I did try it). Still, the game is excellent value for money — and if you don't give up too soon it does become extremely addictive. I was very late to bed the first time I tried it... (it's that trick with time again, I suppose).

Next out of the bag came a graphics adventure, *The Wizard and the Princess*, from Melbourne House for the unexpanded Vic and priced at £5.95. I've reviewed the more traditional text adventure games before but this was the first time I had tried a graphics one. I loaded the tape and waited. After quite a short time the screen turned red at the borders and began to paint a picture of blue skies and green countryside (with a few trees dotted about looking like the trees in *Sk Run*). There was a quite realistic cold wind blowing on the sound effects. I was told I could only move left (by pressing L), right or forward (pressing R and F, of course).

My task was to find the wizard's castle. At first I seemed to be pressing keys to no avail as all that happened was that I fell off some mysterious pyramid structure, totally without explanation, or was confronted by the same green wasteland, then suddenly I was looking at a castle (plus bird song on the soundtrack) and a few presses of F brought me to the instruction to press *Run* and *Shift* so that the tape could load the next part of the adventure into the Vic.

This is quite an ingenious method of getting long and interesting games into the 3.5K of the unexpanded Vic, and I applaud the people who do it for supplying a better standard of game to the owners of the basic computer. Anyway, back to our adventure, and the next stage is a dragon (very well portrayed with high-res graphics) that you have to stab in the

throat — not too hard to accomplish.

We move on to the next stage of the story which is one of the hardest things I have ever come across in a computer game. Basically, you are inside a maze, only instead of the usual bird's eye view of the maze you are actually inside it and can only see the walls and passageways off to left and right. As you move forward so the scene shifts, and by turning left and right you can decide whether to go one way or another. This is extremely hard and I found it essential to plot the maze on paper, otherwise I would never have completed it.

Having found your way through, you are next in a series of rooms and have to find and rescue the princess before a monster gets you (this time the rooms are drawn from above) or you are wounded or even killed. One nice aspect of this game is that if you are zapped by a monster you are not sent all the way back to the very beginning, you only have to start this particular part of the adventure — very handy as I was consistently beaten by the monsters in this section. And then finally you have to take the princess past a nasty-looking troll whilst dodging falling rocks.

## A certain fascination

At the end of it all I was impressed by the package, although parts of the adventure proved tiresome as it is written in Basic and so is quite slow. I liked the maze especially (a real challenge this) and the graphics on the dragon were very atmospheric. This is one adventure game that is not impossible and is quite fun to do again. Very good value for £5.95.

The final game of this review is another graphics adventure, from Anirog again, for the 16K Vic and priced at £6.00. Called *Pharaoh's Tomb*, the basic idea of this game is to enter the ancient Egyptian tomb and avoid the various traps on your way to the magic triangle — shades of *Raiders of the Lost Ark*!

A little man moves up, down, left or right by key control (no joystick for this game, a distinct disadvantage I felt). The game is a blend of the traditional adventure in that there are various directions in which you can travel from room to room, with various objects to pick up along the way, but instead of the text you get graphic drawings of the rooms and the objects.



The game has a certain fascination and is a definite improvement on the limited scope of *The Wizard and the Princess*, but the fact that the graphics are provided tends to detract from the real appeal of the text adventure — the power of the imagination. Gone are the mysterious dragons, the trolls, the vistas of countryside that reside in my own memory and imagery, to be replaced by the very basic drawing ability of the Vic. For that reason, I suspect, the fact that once you have been killed in one way or another and have to start right back at the beginning again is a real drag. After all, the man's progress across the passageways is very slow, and you have to keep your finger on the appropriate key all the time.

The adventure itself has been well constructed and I have yet to solve it. For the player who needs stimulation and challenge this game can provide it, for the hazards include giant spiders, holes that appear out of nowhere and swallow you up, sandtraps and other nasties lying along the way, as well as locked doors that don't open until you've found just the right key. The game is enjoyable — but as I've already said... lacking in something. Still, at £6.00 it is remarkable value for money (a feature Anirog seem to be noted for).

Well, it's time to end again. As I emerge from my Vic and return to the normal world I discover to my horror that it didn't rain after all — that the garden is as dry as can be expected at midnight — and that, as before, the rest of the house seems to have gone to bed. Seems impossible! It is impossible, but maybe Einstein knew a thing or two about computers... ■

| Firm   | Program                                    | Cost           | Value (1-10) |
|--|--|----------------|--------------|
| Anirog Computers<br>26 Balcombe Gardens<br>Horley, Surrey                                    | <i>Krazy Kong</i><br><i>Pharaoh's Tomb</i> | £7.90<br>£6.00 | 9<br>7       |
| Melbourne House<br>131 Trafalgar Road<br>Greenwich<br>London SE10 9TU                        | <i>The Wizard and the Princess</i>         | £5.95          | 6            |
| Wessexsoft<br>(D A S Sneddon)<br>16 Eastlake Avenue<br>Parkstone<br>Poole<br>Dorset BH12 3DG | <i>Star Trek 16K</i>                       | £9.50          | 8            |



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# The sky at night . . .

**R Bradford presents a program for all budding astronomers — locating satellite, Oscar-9**

This program for the 16K Spectrum is for locating UOSAT/OSCAR-9, the satellite at present transmitting data via a voice synthesiser. To listen to this satellite two things are required, first a 145.8 Mhz receiver, and secondly the location of the satellite. This program provides the latter, giving a list of Azimuth/Elevation co-ordinates at a given time.

To listen to this satellite, use a portable radio with aircraft and marine band frequency reception. Reception is quite good on a high pass, consisting of a male voice reading a series of numbers and short words. If a hand-held receiver is used then I suggest that it is used out of doors. OSCAR-9 is not always visible on every

pass over the northern hemisphere.

Two sets of data are required, the location of the observer (a quick look in an atlas can provide this) and the equatorial crossing time and bearing of the satellite for the orbit in question. The satellite data is available from the University of Surrey (phone Guildford 571281).

For those not familiar with astronomy Azimuth is the angle in degrees from North; ie, 90 = East, 180 = South, 270 = West. Elevation being the height above the horizon in degrees.

A breakdown of the program follows along with a test result.

1000 to 1030 Initialise  
1040 to 1130 Input variables  
1140 to 1180 Table heading  
1190 to 1330 Main program loop  
1340 to 1440 Questions  
1450 to 1490 Calculate next orbit  
1500 to 1570 Input new satellite data  
1580 to 1620 Adjust time  
1630 to 1640 Set constants  
1650 to 1700 Input instructions  
1710 to 1750 Time update  
1760 to 1770 Data for input indication

Only one *Poke* has been used in this program and that is for setting the "CAPS LOCK" — *Poking* the same address with 0 will return the keyboard to lowercase. ■

## Test results

Ground Station Co-ordinates 50 North, 0 West  
Equatorial Crossing Time 2346, Bearing 320 West

| Time | Azimuth | Elevation |
|------|---------|-----------|
| 2358 | 93      | 2         |
| 2400 | 72      | 7         |
| 0002 | 46      | 8         |
| 0004 | 22      | 4         |

```

1000 LET O$="OSCAR-9 AZIMUTH/ELEVATION TABLE"
1010 GO SUB 1600
1020 CLS
1030 PRINT "PAPER 7: BORDER 7: INK 1: P"
1040 PRINT AT 3,0;"PLEASE ENTER AS INDICATED"
1050 RESTORE 1760
1060 FOR Q=0 TO 5: READ R,R1,R2,R3,R4,R5
1070 GO SUB 1680
1080 IF Q=0 THEN PAUSE 50
1090 IF Q=1 THEN INPUT LA
1100 IF Q=2 THEN INPUT LO
1110 IF Q=3 THEN INPUT LU
1120 IF Q=4 THEN INPUT XS: IF UAL XS<=0 OR UAL XS>2400 THEN GO TO 1120
1130 NEXT Q
1140 LET L=LA+I: LET Q=LU+1
1150 CLS: PRINT Q$;R1;R2;R3;R4;R5: "Data is position for ground station at co-ordinates";LA;" north";LO;" west"
1160 LET PP=5
1170 PRINT AT PP,0;"Time":AT PP,10;"Azimuth":AT PP,20;"Elevation":AT PP,30;" "
1180 PRINT AT 20,0;INK 1;" "
1190 CLS: CALCULATING
1200 LET T=2
1210 LET B=ASN(P* SIN(H*T/U))
1220 LET C=ACS(C* COS(H*T/U))/C
1230 LET T=T+2
1240 IF T>48 THEN GO TO 1330
1250 LET Z=HUS(C*G). IF Z=PI TH EN LET Z=ABS(H-T)
1260 LET L=ACS(L* SIN L* SIN D* COS D)/(COS L* SIN D)
1270 LET D=ACS(L* SIN L* SIN L* COS D)/(COS L* SIN D)
1280 IF C>G AND C*(PI+G) OR C>(H+G) OR C<(G-PI) THEN LET AZ=360-AZ
1290 LET EL=(PI/2-ATN(H* SIN D/IN(COS D-6371)))%K
1300 GO SUB 1680
1310 GO SUB 1640
1320 GO TO 1200
1330 IF PP=7 THEN PRINT AT 20,0;INK 3;"SATELLITE NOT VISIBLE TH IS ORBIT": GO TO 1355
1340 PRINT AT 20,0;INK 2;" "
1350 PAUSE 200: POKE 23658,8
1360 PRINT AT 20,0;"DO YOU WISH TO PROCESS MORE DATA(Y/N)"
1370 IF INKEY$="" THEN GO TO 1370
1380 IF INKEY$="N" THEN GO TO 1480
1390 CLS: PRINT Q$: "SAME GROUND STATION CO-ORDINATES(Y/N)"
1400 PAUSE 50: IF INKEY$="" THEN GO TO 1400
1410 IF INKEY$="N" THEN GO TO 12
1420 IF CT=2 THEN CLS: PRINT AT

```

```

10,7; INK 2;"ACCUMULATIVE ERROR"
10,7; INK 2;"NOW SIGNIFICANT"
10,7; PAUSE 100: GO TO 1500
1430 CLS: PRINT Q$: PRINT AT 10,0;"NEW SATELLITE POSITION DATA"(Y/N)
1440 PAUSE 50: IF INKEY$="" THEN GO TO 1440
1450 IF INKEY$="Y" THEN GO TO 1500
1460 PRINT AT 13,0;"DATA FOR NEXT ORBIT": "BEING CALCULATED"
1470 LET T2=(VAL T$)+20+J: GO SUB 1710
1480 LET T$=STR$(T2): LET X$=T$
1490 LET U=U+23.927: LET CT=CT+1
1500 PAUSE 70: GO TO 1150
1510 LET CT=0: RESTORE 1770
1520 CLS: PRINT Q$;R1;R2;R3;R4;R5: "Data is position for ground station at co-ordinates";LA;" north";LO;" west"
1530 LET PP=5
1540 PRINT AT PP,0;"Time":AT PP,10;"Azimuth":AT PP,20;"Elevation":AT PP,30;" "
1550 PRINT AT 20,0;INK 1;" "
1560 CLS: CALCULATING
1570 LET T=2
1580 LET B=ASN(P* SIN(H*T/U))
1590 LET C=ACS(C* COS(H*T/U))/C
1600 LET T=T+2
1610 IF T>48 THEN GO TO 1630
1620 LET Z=HUS(C*G). IF Z=PI TH EN LET Z=ABS(H-T)
1630 LET L=ACS(L* SIN L* SIN D* COS D)/(COS L* SIN D)
1640 LET D=ACS(L* SIN L* SIN L* COS D)/(COS L* SIN D)
1650 IF C>G AND C*(PI+G) OR C>(H+G) OR C<(G-PI) THEN LET AZ=360-AZ
1660 LET EL=(PI/2-ATN(H* SIN D/IN(COS D-6371)))%K
1670 GO SUB 1680
1680 GO SUB 1640
1690 GO TO 1570
1700 IF PP=7 THEN PRINT AT 20,0;INK 3;"SATELLITE NOT VISIBLE TH IS ORBIT": GO TO 1720
1710 PRINT AT 20,0;INK 2;" "
1720 PAUSE 200: POKE 23658,8
1730 PRINT AT 20,0;"DO YOU WISH TO PROCESS MORE DATA(Y/N)"
1740 IF INKEY$="" THEN GO TO 1740
1750 IF INKEY$="N" THEN GO TO 1750
1760 CLS: PRINT Q$: "SAME GROUND STATION CO-ORDINATES(Y/N)"
1770 PAUSE 50: IF INKEY$="" THEN GO TO 1770
1780 IF INKEY$="N" THEN GO TO 1780
1790 IF CT=2 THEN CLS: PRINT AT

```



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## Animated action!

David Oxley presents an easy program for storing several images in succession on the 48K Spectrum

This program provides a simple method of storing 16 images in succession and has the ability to display any one image on request, or to flick through all 16, so creating an animated effect.

The program achieves its high speed by using two very simple 12-byte machine code routines: one to store and one to recall the displays. One advantage is that no matter how long it takes to set up the displays, the end results can be viewed in a matter of seconds.

The program will only work on the 48K Spectrum, because it uses just over 32K to store and display the images. As it stands, no allowance has been made for colour, although by the addition of two more routines to store and recall the attribute bytes (22528 to 22783),

this could easily be overcome.

Only 16 images are allowed for, but more could be accommodated — at the cost of losing available RAM. Even so, the 16 pictures still leave a 16K spectrum, 8.6K of which is not taken up by the screen nor by system variables, etc. A program could be designed to control the images in, for example, a mini-adventure where the top third of the screen could be used to display present whereabouts.

Fed the correct data, the program could simulate the movements of somebody walking across the screen, or a dramatic explosion at the end of a game. The possibilities are endless, given the imagination to construct the designs.

### Notes on the main program

Line(s)      Reset RAMTOP and load the machine code  
10 to 40      n holds the number of the present screen  
50      Space for you to put the drawing routines  
90 to 9000      If you want to design each picture in direct mode, enter line 100 STOP. When you have completed the design of that screen, type CONTINUE  
9000 to 9030      The POKE in line 9000 sets the high byte of the DE register pair to store the 'n'th' screen in the correct place  
The USR call executes the 'store' machine code routine. The screen is then cleared, and if fewer than 17 screens have been counted the program continues at line 90  
9100 to 9130      The FOR-NEXT loop calls up each display sequentially by POKEing and then executing the machine code  
9140 to 9170      These lines simply flick through the displays in reverse order

Two short demonstration programs are also included which can simply be Merged into the main program and consequently run. The results are quite astounding! ■

```
10 CLEAR 32575
20 DATA 33,64,0,17,0,64,1,0,
  6,237,176,201,17,64,0,33,
  0,64,1,0,6,237,176,201
30 FOR n=65344 TO 65367
40 READ a: POKE n,a: NEXT n
50 LET n=1
60 REM ** put your displays
  *** after line 90
  ** 90 PRINT INVERSE 0;
  OVER 0; PAPER 7; INK 0; AT
  14,0;"Present screen = ";n
9000 POKE 65358,119+8*n
9010 LET l=USR 65356
9020 CLS
9030 LET n=n+1: IF n<17 THEN
  GO TO 90
9100 FOR n=1 TO 16
9120 POKE 65346,n*8+119: LET
  l=USR 65344
9130 NEXT n
9140 FOR n=15 TO 1 STEP -1
9160 POKE 65346,n*8+119: LET
  l=USR 65344
9170 NEXT n: GO TO 9100
```

```
100 OVER 1
110 FOR a=0 TO 255 STEP n
120 PLOT a,112: DRAW 255-2*a,
  63
130 NEXT a
140 FOR a=0 TO 63 STEP n
150 PLOT 0,a+112: DRAW 255,
  63-2*a
160 NEXT a
```

### Demonstration 1

```
100 CIRCLE 127,143,n*3
110 CIRCLE 127-3*n,143,n
120 CIRCLE 127+3*n,143,n
130 PLOT n*4,175-2*n
140 DRAW 255-8*n,0
150 PLOT n*4,112+2*n
160 DRAW 255-8*n,0
```

### Demonstration 2





# Chance happening . . .

**Boris Allan takes a look at how the Chi-squared technique can be used on BBC in social statistics**

One of the most common techniques used in social statistics (and many other branches of the subject) is that known as "Chi-squared" (pronounced "kie-squared"). Basically a rectangular table of figures, relating two distinct characteristics (in Table 1, voting and religion in the US), is looked at to find if there is a pattern in the figures that could not have very easily happened by chance.

In Table 2 the "expected" numbers of people in each cell are shown if there was no relation between how people voted and their religion. Notice that whereas one would "expect" that about 97 Protestants would vote Republican, actually 29 more (ie, 126) voted in that cell.

If we take the difference between the expected number and the observed number, and square that number (ie,  $29 \times 29$ ), dividing the result by the expected number — to give a form of scaling — the result is about 8.82.

If the same calculations are performed for each cell, we get Table 3: a table of "contributions", which we add up to form chi-squared for this set of data is 30.8557, and with this value is associated two "degrees of freedom" — that is, we can choose the values for two cells, and then all the other values are fixed if we keep the row and column totals fixed.

From statistical tables we see that the possibility of finding a value of chi-squared as large as this, for two degrees of freedom, is so low that we can be almost certain that it did not happen merely by chance. (A probability, a confidence level, of 1.)

The BBC Basic program listed here performs all these calculations, and displays all these tables. It also saves the use of statistical tables because it produces

the probability level.

As the program is dependent upon the use of procedures and functions, I will start from line 250 onwards before looking at the main program. It might be worth remembering that the functions and procedures were written in the order in which they appear in the program: *Fnprob* first, and *Procmatprint* last.

*Fnprob* works out the probability that a value of chi-squared  $X^2$  with DF degrees of freedom would have occurred by chance. The formula used is an approximation (but is very close) to the proper value. The function uses a local variable *A*, which only exists whilst the function is being called. The *Rem End Fnprob* is to help in reading the listing, as the function extends over more than one line.

*Fnformat* is used to control the number of decimal places (*N*) in output of a number *X* — on some computers the use of the

power operator is not exact, but in this case it is.

*Fnxp* calculates an expected value for cell *I,J*: the row totals are stored as *M(I,O)*, the column totals as *M(O,J)*, and the overall total is *M(O,O)*. When the matrix of expected values is output this function is used, and expected values are not stored in any matrix (to save space).

*Procontrib* calculates the individual contributions, stores them in matrix *M*, and leaves the total in the global variable *Chi* (the matrix *M* is also global for two reasons: it is not possible to have a matrix as a parameter; and it is not possible to modify the value of a parameter within a procedure, and leave the parameter value modified).

Global means that it is recognised by all procedures and functions, even though it is not a parameter or local variable. The parameters *R,C* give the number of rows and columns: the local variables *I,J* are used as loop counters.

*Procmain* merely reads in (from DATA statements, best placed at about 220) the number of rows and columns, and then the elements of the table. I use DATA statements because I find that errors are easily spotted, and therefore less errors are made.

*Procnit* dimensions *M* to (10,10), which is easily altered, and inputs the title as *Titles*.

*Procmatprint* has many parameters: *T\$* is the general title, *D\$* is the sub-heading; *R,C* are as ever; *Switch* is used to choose whether the raw elements are printed (*Switch=0*), or the expected values (*Switch=1*); and *Decimal* controls the number of decimal places in the figures printed. Essentially, there are two simple loops and one decision (in lines 580); the local variable *A\$* is used to stop the program after a table has been output.

Returning to the main program (lines 110 to 180), most is now self-explanatory. The portions between quotes, for the *Procmatprint* calls, delineate the three tables: the *Mode* and *Vdu* instructions in line 110 are purely for decoration. ■

TABLE 1 : OBSERVED VALUES

|                  | Prot | RC | Jew |
|------------------|------|----|-----|
| Votes Republican | 126  | 61 | 38  |
| Votes Democrat   | 71   | 93 | 69  |

TABLE 2 : EXPECTED VALUES

|            | Prot   | RC    | Jew   |
|------------|--------|-------|-------|
| Republican | 96.78  | 75.66 | 52.57 |
| Democrat   | 100.22 | 78.34 | 54.43 |

TABLE 3 : CONTRIBUTIONS

|            | Prot | RC   | Jew  |
|------------|------|------|------|
| Republican | 8.82 | 2.84 | 4.04 |
| Democrat   | 8.52 | 2.74 | 3.9  |

Chi-squared is 30.8556652 with 2 DoF  
Probability is 1

```

L.
10REM .....
20REM .....
30REM .....
40REM CHI-SQUARED ANALYSIS OF TABLES
50REM .....
60REM (C) BORIS ALLAN, 1983
70REM .....
80REM .....
90REM .....
100REM .....
110MODE 6: VDU 19,0,4,0,0,0
120PROCINIT
130PROCMAIN
140PROCMPRINT(TITLE$, "OBSERVED", R, C, 0, 0)

```

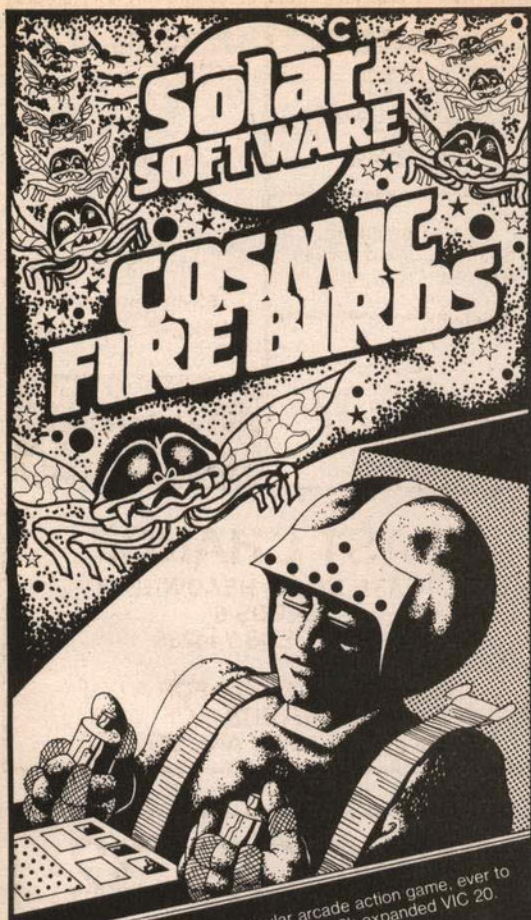


```

150PROC MATPRINT(TITLE$, "EXPECTED", R, C, 1, 2)
160PROC CONTRIB(R, C)
170PROC MATPRINT(TITLE$, "CONTRIBUTIONS", R, C, 0, 2)
180PRINT "CHI-SQUARED IS "; CHI; " WITH "(R-1)*(C-1)" Dof"" "PROBA
BILITY IS "; FN FORMAT(1-FNPROB((C-1)*(R-1), CHI), 3)""
190END
200REM-----
210REM-----
220REM PUT DATA STATEMENTS ABOUT HERE
230REM-----
240REM-----
250DEF FNPROB(DF, X2): LOCAL A
260A=2/(9*DF): A=((X2/DF)^(1/3)-1+A)/SQR(A)
270=.5/(1+A*(.196854+A*(.115194+A*(.000344+A*.019527))))^4: REM END
FNPROB
280REM-----
290REM-----
300DEF FNFORMAT(X, N)=INT(X*10^N+.5)/10^N
310REM-----
320REM-----
330DEF FNEXP(I, J)=M(I, 0)*M(0, J)/M(0, 0)
340REM-----
350REM-----
360DEF PROC CONTRIB(R, C): LOCAL I, J
370CHI=0: FOR I=1 TO R: FOR J=1 TO C
380M(I, J)=(M(I, J)-FNEXP(I, J))^2/FNEXP(I, J): CHI=CHI+M(I, J)
390NEXT J, I
400ENDPROC: REM CONTRIB
410REM-----
420REM-----
430DEF PROC MATIN: LOCAL I, J
440READ R, C: FOR I=0 TO 10:M(I, 0)=0: M(0, I)=0: NEXT I
450FOR I=1 TO R: FOR J=1 TO C: READ M(I, J): M(0, 0)=M(0, 0)+M(I, J):M
(I, 0)=M(I, 0)+M(I, J): M(0, J)=M(0, J)+M(I, J): NEXT J, I
460ENDPROC: REM MATIN
470REM-----
480REM-----
490DEF PROC INIT
500DIM M(10, 10)
510CLS: PRINT "" "CHI-SQUARED ANALYSIS"" "DATA STATEMENTS ARE
REQUIRED"" "IF THERE ARE NONE TYPE ESC"
520INPUT "WHAT IS THE TITLE ", TITLE$
530ENDPROC: REM INIT
540REM-----
550REM-----
560DEF PROC MATPRINT(T$, D$, R, C, SWITCH, DECIMAL): LOCAL I, J, A$
570CLS: PRINT "T$;" "D$"" :FOR I=1 TO R: FOR J=1 TO C
580IF SWITCH=1 THEN PRINT FNFORMAT(FNEXP(I, J), DECIMAL); ELSE PRINT
FNFORMAT(M(I, J), DECIMAL);
590NEXT J: PRINT
600NEXT I: INPUT A$
610ENDPROC: REM MATPRINT
620REM-----

```





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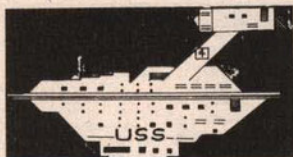
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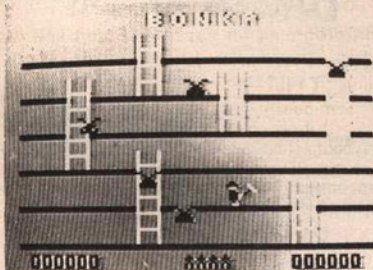
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## Profiled!

**R Walton explains how to design a cam and draw its profile in hi-res graphics**

This program should be of interest to Dragon users involved in mechanical engineering, either professionally or through technical drawing at school or college. It enables the user to calculate a cam and draw its profile in high-resolution graphics. Readers who enjoy producing graphic patterns will also find the draw routine interesting.

For those who are not familiar with the subject, a cam is a device for converting rotary motion into linear motion. It is often used in conjunction with a pivoting lever which has a roller attached to one end of it. This roller, known as the cam follower, is held onto the face of the cam by pressure from a spring and as the cam turns, 'bumps' in its profile cause the lever to move backwards and forwards.

Simple cams are often cut on a vertical milling machine using a cutter of the same diameter as the cam follower. A circular

cam blank of cast-iron is mounted on the machine and the cutter is touched onto the edge. As the blank is turned through 360° (in small increments), the cutter is moved in towards the centre of the blank and back out to form the cam profile.

The profile is carefully calculated to avoid harsh and unnecessary accelerating forces, particularly at the beginning and end of the movement. This program uses one of the more basic cam forms known as Simple Harmonic Motion.

The best way to understand the program is to run it, entering the values suggested below:

| STEP             | VALUE |
|------------------|-------|
| 1. (Blank Dia.)  | = 240 |
| 2. (Cutter Dia.) | = 32  |
| 3. (Bore Dia.)   | = 38  |
| 4. (Fall)        | = F   |
| 5. (Amount)      | = 60  |
| 6. (Angle)       | = 90  |
| 7. (Increment)   | = 2   |
| 8. (Dwell)       | = D   |
| 9. (Angle)       | = 30  |
| 10. (Increment)  | = 2   |
| 11. (Rise)       | = R   |
| 12. (Amount)     | = 60  |
| 13. (Angle)      | = 180 |
| 14. (Increment)  | = 2   |
| 15. (Dwell)      | = D   |
| 16. (Angle)      | = 60  |
| 17. (Increment)  | = 3   |

On running, and after answering the

prompts, you will see printed tables of degrees and ordinates plotting the path of the cutter. These are stored in arrays for use in the draw routine.

When the full 360° of the profile has been calculated, the cutter should be back at its start position. The background for the drawing is now prepared — centre lines, bore and boss diameters are all plotted.

The Dragon then draws closely pitched circles around the centre of the screen, representing the cutter path. The form left is the cam profile. This is not the same shape as the centre line path of the cutter due to the varying contact point between cam and cutter — and hence this method of drawing is always used for cams.

### Program Notes

|           |  |
|-----------|--|
| 5-80      | Sets main variables  |
| 80-106    | Input for first part of cam (which cannot be a rise)               |
| 200-250   | Main input section   |
| 300-360   | Calculate ordinates, adjust values for drawing and store in arrays |
| 500-550   | Prompt routine for 'Dwell' inputs                                  |
| 600-660   | Prompt routine for 'Fall' inputs                                   |
| 700-760   | Prompt routine for 'Rise' inputs                                   |
| 800-810   | 'Reminder' routine for current position                            |
| 1000-1040 | Subroutine for drawing background                                  |
| 2000-2040 | Subroutine for circle drawing                                      |

I have used a scaling factor (X.7) in lines 70, 80 and 2020 to produce a half full size drawing on my 14" television screen. ■

### 5 REM\*\*\*CAM DESIGN\*\*\*

```

10 CLS:PRINT@202,"CAM DESIGN":PRINT
  @234,"-----":PRINT@292,"(SIMPLE
  HARMONIC MOTION)":PRINT@468,"COPYRIGHT R.WALTON"
20 FOR P=1 TO 1500:NEXT P:CLS
30 DIM A(360),D(360),R(15):C=0:D=0:S=0
40 PRINT@34,"ALL DIMENSIONS IN MILLI
  METERS":PRINT@74,"*****"
50 PRINT@98,"ENTER CAM BLANK DIAMETER"
60 PRINT@130,"(DO NOT EXCEED 250)":
  INPUT R(S):R(S)=R(S)/2
70 PRINT@226,"ENTER CUTTER/CAM FOLL
  OWER DIAMETER (USUALLY 25 OR
  32)":INPUT CD:CR=CD/2*.7
80 PRINT@354,"ENTER BORE DIAMETER
  (USUALLY 25-38)":INPUT BD:BR=BD/
  2*.7
90 CLS:PRINT@37,"PROFILE CALCULATIONS"
100 PRINT:INPUT "IS FIRST SECTOR A
  DWELL(D) OR FALL(F)":A#
105 IF A#="D" THEN 500
106 IF A#="F" THEN 600 ELSE 90
200 CLS:PRINT@37,"PROFILE CALCULATIONS"
210 GOSUB@800
220 PRINT@98,"IS NEXT SECTOR A
  DWELL(D), FALL(F) OR RISE(R)":IN
  PUT B#
230 IF B#="D" THEN 500
240 IF B#="F" THEN 600
250 IF B#="R" THEN 700 ELSE 200
300 CLS:FOR AY=0 TO AH STEP 1
310 F=INT((H/2*(1-COS(3.142*AY*(3.142/
  180)*X360/(2*AH*(3.142)))*)1000+.5)/1000
320 A(C)=R(S)+F:D(C)=D
330 PRINT D(C):TAB(15):A(C)
340 D=D+I:C=C+1:NEXT AY
350 FOR P=1 TO 1000:NEXT P:D=D-I:C=
  C-1:S=S+1:R(S)=A(C)
360 IF D<360 THEN 200 ELSE 1000
500 CLS:PRINT@42,"**DWELL**"
510 GOSUB @800
520 H=0:PRINT@98,"ENTER ANGLE OF
  DWELL":INPUT AH

```

```

530 PRINT@226,"ENTER CUTTER
  INCREMENT":INPUT I:IF I<1 THEN 530
540 FOR P=1 TO 300:NEXT P
550 GOTO 300
600 CLS:PRINT@43,"**FALL**"
610 GOSUB @800
620 PRINT@98,"ENTER AMOUNT OF FALL"
  INPUT H:H=-1*.H
630 PRINT@226,"ENTER ANGLE OF FALL":
  INPUT AH
640 PRINT@354,"ENTER CUTTER INCRE
  MENT":INPUT I:IF I<1 THEN 640
650 FOR P=1 TO 300:NEXT P
660 GOTO 300
700 CLS:PRINT@43,"**RISE**"
710 GOSUB @800
720 PRINT@98,"ENTER AMOUNT OF RISE":
  INPUT H
730 PRINT@226,"ENTER ANGLE OF RISE":INPUT
  AH
740 PRINT@354,"ENTER CUTTER INCRE
  MENT":INPUT I:IF I<1 THEN 740
750 FOR P=1 TO 300:NEXT P
760 GOTO 300
800 IF C>0 THEN PRINT@487,"LAST ORD
  INATE =":A(C):IF C>0 THEN PRINT@488,
  "ANGLE SO FAR =":J:D
810 RETURN
999 REM***BACKGROUND ROUTINE***
1000 PMODE 4,1:SCREEN 1,1:PCLS
1010 LINE(0,96)-(255,96),PSET:LINE
  (128,0)-(128,191),PSET
1020 FOR X=670246 STEP 30:PRESET(X,96):
  PRESET(X+3,96):NEXT X
1030 FOR Y=5 TO 185 STEP 30:PRESET
  (128,Y):PRESET(128,Y+3):NEXT Y
1040 CIRCLE(128,96),BR:CIRCLE(128,96),24
2000 REM***PROFILE DRAW ROUTINE***
2010 FOR P=0 TO C
2020 CIRCLE(128+(A(P)*.7)*COS(D(P)*X3
  .142/180),96+(A(P)*.7)*SIN(D(P)*X3.
  142/180),CR
2030 NEXT P
2040 GOTO@2040

```







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## Functions

### on Vic20

At last! A general graph solution program for the unexpanded Commodore Vic20 which enables the user to find the solution of any real function of  $X$  (eg.  $2 \cdot X^3 + 3 \cdot 1$ ) and to plot its graph.

The program consists of two main sections which can be typed in separately if necessary (with some rearrangement) and which are described below. A preceding input and menu section controls program operation.

The first main section searches for and calculates the solution(s) of any function of

$X$ , and the second plots the graph of the function over an inputted range. This graph is plotted using horizontal bars (or vertical bars in special cases), although lucky programmers with memory expansion can adapt the program to plot the graph in hi-res mode.

One aspect of the program which might be of interest occurs in lines 50-60. This is a way of inputting a string and incorporating it into the program as a program line without program execution being halted (by the user). After inputting the string an appropriate number of *Return*'s are poked into the keyboard buffer (locations 631-640, code for *Return* is 13), and the total

number of characters then in the buffer is poked into location 198. Using the screen editor the lines to be entered are printed on the screen and the cursor positioned so that on program termination (occurs automatically), the *Return*'s coincide with the lines. One of the lines will be a *Run* statement.

The program pays particular attention to screen format and includes full instructions. An explanation of the listing is given below.

### Program notes

|         |  |
|---------|--|
| 20-42   | Input function and derivative                        |
| 50-60   | Incorporate above inputs into program (lines 99-101) |
| 102-109 | Menu   |
| 110-185 | Search for solutions                                 |
| 190-214 | Second menu  |
| 220-250 | Calculate a solution                                 |
| 440-610 | Input range to plot, discontinuities                 |
| 620-670 | Further instructions                                 |
| 680-720 | Calculate max,min                                    |
| 730-800 | Draw axes  |
| 810-830 | Draw graph   |
| 840-890 | Details of previous graph                            |

```

2 REM SOLVE F(X)=0
4 REM COPYRIGHT O.G.GARSDIE
5 REM HEBDEN BRIDGE,YORKSHIRE
20 PRINT "TO SOLVE F(X)=0:PRINT"
30 PRINT "INPUT X:PRINT"FUNCTION F(X) IN
  TERMSOF X:PRINT"DERIVATIVE F'(X)"
40 INPUT "F(X)";AA$:IFA$=""THENPRINT"1"
  GOT040
42 INPUT "F'(X)";BB$:IFBB$=""THENPRINT"
  111" GOT042
50 PRINT "99AA$=";CHR$(34);
  AA$:CHR$(34)
55 PRINT "100DEFFNA(X)=""AA$:PRINT"101DEFF
  NB(X)=""BB$:PRINT"RUN99"
60 FORI=1T04:POKE630+I,13:NEXT:POKE198,
  4:END
102 PRINT "MENU:PRINT"3P=PLOT
  GRAPH OF F(X)
103 PRINT "3S=SEARCH FOR SOLUTIONS:AC=
  CALCULATE A SOLUTION"
104 PRINT "3E=END"
105 GETA$:IFA$<"C"ANDAS<"S"ANDAS<"P"
  ANDAS<"E"THEN105
106 IFA$="E"THENEND
107 IFA$="P"THEN450
108 IFA$="C"THEN220
109 IFA$="A"THEN300
110 PRINT "GIVE RANGE OF VALUES OF X TO
  SEARCH FOR SOLUTIONS."
111 PRINT "F(X) MUST BE CONTINUOUS IN
  THIS RANGE."
120 INPUT "X=";A:INPUT "X<=";B:IFA$=B
  THEN109
125 J=10
130 PRINT "RANGE "A"<X<"B:PRINT"
  SEARCHING":F=0
140 S=(B-A)/J:PRINT"SIEVE WIDTH"S:PRINT
150 FORX=ATOBSTEPS:Y=X+S
160 IFABS(FNA(X))<ABS(X)*10^-9THENPRINT"
  SOLUTION X="X:F=1 GOT0185
170 IFABS(FNA(Y))<ABS(X)*10^-9THEN185
180 IFSGN(FNA(X))*SGN(FNA(Y))<0THENPRINT
  INT(1E7*(X-Y)/-1E7)"SOLUTION"INT(1E7*(X-Y)
  )/-1E7:F=1
185 NEXT IFF=0THENPRINT"NO SOLUTIONS
  FOUND"
190 PRINT "3F=REPEAT WITH FINER SIEVE"
200 PRINT "3R=TRY ANOTHER RANGE"
205 PRINT "3C= CALCULATE A SOLUTION"
206 PRINT "3M= RETURN TO MENU"
210 GETA$:IFA$<"M"ANDAS<"C"ANDAS<"R"
  ANDAS<"F"THEN210
211 IFA$="F"THENJ=J*10 GOT0130
212 IFA$="R"THEN109
214 IFA$="M"THENRUN99
220 PRINT "APPROXIMATE SOLUTION X:
  INPUT X=X:PRINT
230 IFABS(FNB(X))<ABS(X)*10^-9THENPRINT"
  STATIONARY VALUE ATX="X:GOT0200
240 IFABS(FNA(X)/FNB(X))<ABS(X)*10^-9)
  THENX=X-FNA(X)/FNB(X):GOT0230
250 PRINT "SOLUTION X="X:PRINT"X" GOT0200
415 RUN99
440 REM GRAPH PLOT
450 SC=7680
460 DIMF(21),LX(21),CX(7)
480 PRINT "GIVE THE RANGE OF VALUES OF
  X TO PLOT"
490 INPUT "X=";A
500 INPUT "X<=";B:PRINT IFA$=BGOT0480
510 S=(B-A)/22
520 PRINT "GIVE THE NUMBER OF DISCONTINUITIES IN THE INPUT RANGE";A%
530 IFA$<0GOT0520
540 IFA$<0GOT0610
550 PRINT "WHAT VALUE";IFA$>1THEN
  PRINT"S"
560 PRINT "OF X?"
570 FORI=1T0A%
580 INPUT "X=";K:IFK<BANDK>=ATHENLX(INT(
  (K-A)/S))=1
590 NEXT
600 PRINT "FORI=0T07:READCX(I):NEXT
610 PRINT "FORI=0T07:READCX(I):NEXT
620 PRINT "PLEASE WAIT."
630 PRINT "F(X)=""AA$
640 PRINT "THE GRAPH IS PLOTTED USING
  HORIZONTAL BARS - THE MID-POINT OF THE"
650 PRINT "BAR GIVING AN ACCURATEPLOT." K=TI

```

Continued over the page



```

570 PRINT "PRESS SPACE TO
    CONTINUE AFTER GRAPH"
580 F=1:H=A-S/2:FOR I=0 TO 21:H=H+S:IF L<I)
    GOT0720
590 F(I)=FNA(H):IFF THEN MAX=F(I):MIN=F(I):
    F=0:GOT0720
700 IFF(I)>MAX THEN MAX=F(I):GOT0720
710 IFF(I)<MIN THEN MIN=F(I):GOT0720
720 NEXT
730 IFT I-K<250 GOT0730
740 PRINT "J":H=(MAX-MIN)/22:IF H=0 THEN H=1
750 AX=INT(-A/S):K=INT(((A/S)-AX)*8):
    IF AX<0 AND K>0 THEN K=0
751 FOR I=0 TO K:READ X: NEXT: IF AX<0 OR AX>21
    GOT0770
760 K=SC+AX:FOR I=0 TO 22:POKE K,X:
    POKE 30720+K,0:K=K+22:NEXT
770 AY=INT(-MIN/H):AZ=INT(((MIN/H)-AY)*8):
    AY=22-AY:IF AY<0 OR AY>22 GOT0810
780 K=CX(AZ):F=SC+AY*22:FOR I=0 TO 21:IFI=AX

```

```

    THEN POKE F+I,48:POKE 30720+F+I,0:GOT0800
790 POKE F+I,K:POKE 30720+F+I,0
800 NEXT
810 FOR I=0 TO 21:IF L<I) GOT0830
820 K=(F(I)-MIN)/H:P=(22-INT(K))*22+I:
    POKE SC+P,CX(INT((K-INT(K))*8)):POKE
    38400+P,0
830 NEXT
840 GET A$:IFA$<" " THEN 840
850 PRINT "PREVIOUS GRAPH"
860 PRINT A"<X<="B:PRINT "MIN"<Y<="MAX:
    PRINT "X(X)=":A$
870 PRINT "PRESS SPACE TO RETURN TO MENU"
880 GET A$:IFA$<"M" THEN 880
890 RUN 99
900 DATA 100,82,70,64,67,68,69,99,101,84,71,
    66,93,72,89,103,103

```

**Functions**  
by O G Garside

## Titles

### on Spectrum

An easy method of producing titles, ready to store on your video recorder. Steve Mercer's color strips program (February 3) may be usefully merged. Just connect your aerial lead direct to your video

recorder, you cannot damage it!

The program allows you to select border and paper colour for the whole screen, then allows you to input individually centered lines of text display, each one having separate paper colour on contrasting ink, with flash and bright on or off.

Pressing *Enter* in response to the Title

prompt gives a blank line (scroll down one line), and to finish enter '\*'.

The display is then finalised and held until any key is pressed (no prompts or error messages to mar the display). Then the next display page is started.

If hard copy is wanted enter a new line: 265 Copy.

99:REM TITLES © Dennis Lyons  
Feb 1983

```

100 CLS
110 DIM C$(1)
120 INPUT "BORDER ?";border:BO
RDER border: IF border<0 OR bord
er>9 THEN GO TO 120
130 INPUT "PAPER ?";paper:PAPE
R paper:CLS: IF paper<0 OR pap
er>9 THEN GO TO 130
140 LET count=0
150 LET count=count+1:
    REM counter
160 INPUT "ENTER TITLE ";P$:LE
T L=LEN P$: IF L<30 THEN GO TO 1
60
170 IF P$="" THEN GO TO 150:
    REM counter
180 IF P$="" THEN LET P$="": G
O TO 250: REM end of input
190 INPUT "FLASH OFF (0) / ON (1)
?";flash:FLASH flash
200 INPUT "BRIGHT OFF (0) / ON (1)
?";bright:BRIGHT bright
210 INPUT "PAPER";C$: IF C$=CHR
$(32) THEN LET paper=7: GO TO 2
30: REM skip next line
220 LET paper=VAL C$
230 PRINT AT count+1,(32-L)/2:
    INVERSE 1: FLASH flash: BRIGHT b
right: PAPER paper: INK 9:P$: FL
ASH 0: BRIGHT 0: INVERSE 0
240 GO TO 150:
    REM counter
250 GO SUB 9800:
    REM color strips by Steve M

```

```

ercer
260 PAUSE 0:
    REM wait for keypress to ke
ep screen display clean
270 RUN:
    REM get another line for di
splay
280:
290:
299:

```

TITLE PAGE

SINGLE SPECTRUM

PRESS ENTER FOR BLANK LINE

PRESS ENTER FOR BLANK LINE

**Titles**  
by Dennis Lyons

## Lunar Lander

### on Ace

You are the shuttle-craft which starts at a random position at the top of the screen. The idea is to land on one of the space station landing platforms which you keep floating past.

You can move with keys "5" (left), "8" (right) and "6" (upwards thrust).

### Graphics notes

```

" / INVERSE VIDEO
GRAPHICS 3: " / INVERSE VIDEO
GRAPHICS 4: " / GRAPHICS 7: " Δ "

```

### Program notes

```

0 VARIABLE S (enter)
: SEEDON S @ 75 U+ 75 0 D+ OVER OVER U<-
-1- DUP S1: (enter)
: RND SEEDON U+ SWAP DROP: (enter)
1 VARIABLE X (enter)
1 VARIABLE Y (enter)
0 VARIABLE A (enter)
0 VARIABLE B (enter)

```

```

:LL CLS 1 X130 RND Y10 A1 1000 0 DO 30 0 DO 19
:IDUP B1 AT "ΔJ" X@Y @ AT "ΔΔ" A@1+ A!
INKEY 53 = IF Y @ 1- Y! THEN INKEY 56 = IF Y @
1+ Y! THEN X @ 1+ X! INKEY 54 = IF X @ 2- X!
THEN X @ 19 = IF Y @ B @ > IF Y @ B @ 3+ < IF
"ΔΔID IT! SCORE =" A @ . 10 100 DO 100
BEEP -10+ LOOP QUIT THEN THEN THEN X @ 19
= IF Y @ B @ 1+ IF "ΔΔCRASHED" 450 1000
BEEP QUIT THEN Y @ B @ 3+ > IF
"ΔΔCRASHED" 450 1000 BEEP QUIT THEN
THEN X @ Y @ AT "ΔY" 300 60 BEEP LOOP LOOP
: (enter)

```

**Lunar Lander**  
by Andrew Curtis



## Rock Attack on Spectrum

You are the commander of a starship returning to earth from your travels to other galaxies.

Your mission is nearly complete and only the asteroid field lies between you and earth. As you manoeuvre through the large rocks you notice one asteroid on the edge of your screen lumbering towards you. Using your controls you must turn and

fire or thrust to avoid the rock.

Your task has been allotted, so using the keys indicated in the instructions you must save your ship. Just to make things even harder, if you clear a screen you must start again at a new position on the screen.

```

1 REM *****ROCK ATTACK*****
2 REM **
3 REM **BY JAMES HURRELL**
4 REM ** & DARREN WALKER **
5 REM *****
6
7 BORDER 0:PAPER 0:CLS
8 FOR U=1 TO 15
9   READ A$
10  FOR C=0 TO 7
11    POKE USR A$+C,A
12  NEXT C
13  NEXT V
14  PRINT INK 5; BRIGHT 1; AT 0,10;"ROCK ATTACK"
15  PRINT AT 1,9;" "
16  PRINT AT 4,13; FLASH 1;"ALERT!"; AT 5,8;"ASTEROIDS AHEAD"
17  PRINT "";" '1'...ROTATE LEFT
18  PRINT "";" '3'...ROTATE RIGHT"
19  PRINT "";" '9'...THRUST
20  PRINT "";" '0'...FIRE"
21  PLOT INK INT(RND*6)+1,RND*255,RND*175
22  IF INKEY="" THEN GOTO 102
23  CLS
24  LET S=0:LET L=3
25  LET B=15:LET A=10:LET R$="ABCDEF0H":LET C=1:LET L$="FFF"
26  LET A1=1:LET B1=1:LET X1=2:LET A2=1:LET B2=2:LET X2=2:
27  LET A3=1:LET B3=30
28  LET X3=2:LET A4=14:LET B4=6:LET X4=2
29  PRINT BRIGHT 1;INK 5; AT A,B,R$<C>
30  INK 6
31  IF X1=1 THEN PRINT BRIGHT 1; AT A1,B1;"I"
32  IF X1=2 THEN PRINT BRIGHT 1; AT A1-1,B1-1;"JKL";
33  AT A1,B1-1;"MNO"
34  IF X2=1 THEN PRINT BRIGHT 1; AT A2,B2;"I"
35  IF X2=2 THEN PRINT BRIGHT 1; AT A2-1,B2-1;"JKL";
36  AT A2,B2-1;"MNO"
37  IF X3=1 THEN PRINT BRIGHT 1; AT A3,B3;"I"
38  IF X3=2 THEN PRINT BRIGHT 1; AT A3-1,B3-1;"JKL";
39  AT A3,B3-1;"MNO"
40  IF X4=1 THEN PRINT BRIGHT 1; AT A4,B4;"I"
41  IF X4=2 THEN PRINT BRIGHT 1; AT A4-1,B4-1;"JKL";
42  AT A4,B4-1;"MNO"
43  PRINT AT 0,14;S; AT 0,0:L$< TO L>
44  IF ATTR (A,B)=70 THEN GO TO 6000
45  LET D$=INKEY$
46  IF D$="1" THEN GO SUB 1000
47  IF D$="3" THEN GO SUB 1020
48  IF D$="9" THEN BEEP .01-.20:GO SUB C*4+500
49  IF D$="0" THEN BEEP .01-.20:GO SUB C*10+2000
50  IF X1=1 OR X2=2 THEN LET A1=A1+1:LET B1=B1+1
51  IF B1=30 THEN LET B1=1
52  IF A1=20 THEN LET A1=2
53  IF X2=1 OR X2=2 THEN LET A2=A2+1:LET B2=B2-1
54  IF A2=20 THEN LET A2=2
55  IF B2=1 THEN LET B2=30
56  IF X3=1 OR X3=2 THEN LET A3=A3-1:LET B3=B3-1
57  IF A3=2 THEN LET A3=20
58  IF B3=1 THEN LET B3=30
59  IF X4=1 OR X4=2 THEN LET A4=A4-1:LET B4=B4+1
60  IF A4=2 THEN LET A4=20
61  IF B4=30 THEN LET B4=1
62  CLS
63  GOTO 150
64  LET B=B-1:IF B=0 THEN LET B=31
65  RETURN
66  LET A=A+1:LET B=B-1:IF A=21 THEN LET A=0
67  IF B=0 THEN LET B=31
68  RETURN
69  LET A=A+1:IF A=21 THEN LET A=0
70  RETURN
71  LET B=B+1:IF B=31 THEN LET B=0
72  RETURN
73  LET A=A-1:LET B=B+1:IF A=0 THEN LET A=21
74  IF B=31 THEN LET B=0
75  RETURN
76  LET A=A-1:IF A=0 THEN LET A=0
77  RETURN
78  LET A=A-1:LET B=B-1:IF A=0 THEN LET A=21
79  IF B=0 THEN LET B=31
80  RETURN
81  LET C=C+1:IF C=9 THEN LET C=1
82  RETURN
83  LET C=C-1:IF C=0 THEN LET C=9
84  RETURN
85  FOR F=B-1 TO 0 STEP -1:LET F=A
86  PRINT AT 0,F;" "
87  IF ATTR (0,F-1)=70 THEN GO TO 4000
88  NEXT F
89  NEXT A
90  LET O=A+1
91  FOR F=B-1 TO 0 STEP -1
92    PRINT AT 0,F;" "
93    IF ATTR (0,F-1)=70 THEN GO TO 4000
94  NEXT F
95  NEXT A
96  FOR O=A+1 TO 21:LET F=B
97  PRINT AT 0,F;" "
98  IF ATTR (0+1,F)=70 THEN GO TO 4000
99  NEXT O
100 RETURN
101 LET O=A+1
102 FOR F=B-1 TO 0 STEP -1
103   PRINT AT 0,F;" "
104   IF ATTR (0,F-1)=70 THEN GO TO 4000
105 NEXT F
106 NEXT A
107 FOR O=A+1 TO 21:LET F=B
108 PRINT AT 0,F;" "
109 IF ATTR (0+1,F)=70 THEN GO TO 4000
110 NEXT O
111 RETURN
112 LET O=A+1
113 FOR F=B-1 TO 0 STEP -1
114   PRINT AT 0,F;" "
115   IF ATTR (0,F-1)=70 THEN GO TO 4000
116 NEXT F
117 NEXT A
118 FOR O=A+1 TO 21:LET F=B
119 PRINT AT 0,F;" "
120 IF ATTR (0+1,F)=70 THEN GO TO 4000
121 NEXT O
122 RETURN
123 LET O=A+1
124 FOR F=B-1 TO 0 STEP -1
125   PRINT AT 0,F;" "
126   IF ATTR (0,F-1)=70 THEN GO TO 4000
127 NEXT F
128 NEXT A
129 FOR O=A+1 TO 21:LET F=B
130 PRINT AT 0,F;" "
131 IF ATTR (0+1,F)=70 THEN GO TO 4000
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147   PRINT AT 0,F;" "
148   IF ATTR (0,F-1)=70 THEN GO TO 4000
149 NEXT F
150 NEXT A
151 FOR O=A+1 TO 21:LET F=B
152 PRINT AT 0,F;" "
153 IF ATTR (0+1,F)=70 THEN GO TO 4000
154 NEXT O
155 RETURN
156 LET O=A+1
157 FOR F=B-1 TO 0 STEP -1
158   PRINT AT 0,F;" "
159   IF ATTR (0,F-1)=70 THEN GO TO 4000
160 NEXT F
161 NEXT A
162 FOR O=A+1 TO 21:LET F=B
163 PRINT AT 0,F;" "
164 IF ATTR (0+1,F)=70 THEN GO TO 4000
165 NEXT O
166 RETURN
167 LET O=A+1
168 FOR F=B-1 TO 0 STEP -1
169   PRINT AT 0,F;" "
170   IF ATTR (0,F-1)=70 THEN GO TO 4000
171 NEXT F
172 NEXT A
173 FOR O=A+1 TO 21:LET F=B
174 PRINT AT 0,F;" "
175 IF ATTR (0+1,F)=70 THEN GO TO 4000
176 NEXT O
177 RETURN
178 LET O=A+1
179 FOR F=B-1 TO 0 STEP -1
180   PRINT AT 0,F;" "
181   IF ATTR (0,F-1)=70 THEN GO TO 4000
182 NEXT F
183 NEXT A
184 FOR O=A+1 TO 21:LET F=B
185 PRINT AT 0,F;" "
186 IF ATTR (0+1,F)=70 THEN GO TO 4000
187 NEXT O
188 RETURN
189 LET O=A+1
190 FOR F=B-1 TO 0 STEP -1
191   PRINT AT 0,F;" "
192   IF ATTR (0,F-1)=70 THEN GO TO 4000
193 NEXT F
194 NEXT A
195 FOR O=A+1 TO 21:LET F=B
196 PRINT AT 0,F;" "
197 IF ATTR (0+1,F)=70 THEN GO TO 4000
198 NEXT O
199 RETURN
200 LET O=A+1
201 FOR F=B-1 TO 0 STEP -1
202   PRINT AT 0,F;" "
203   IF ATTR (0,F-1)=70 THEN GO TO 4000
204 NEXT F
205 NEXT A
206 FOR O=A+1 TO 21:LET F=B
207 PRINT AT 0,F;" "
208 IF ATTR (0+1,F)=70 THEN GO TO 4000
209 NEXT O
210 RETURN
211 LET O=A+1
212 FOR F=B-1 TO 0 STEP -1
213   PRINT AT 0,F;" "
214   IF ATTR (0,F-1)=70 THEN GO TO 4000
215 NEXT F
216 NEXT A
217 FOR O=A+1 TO 21:LET F=B
218 PRINT AT 0,F;" "
219 IF ATTR (0+1,F)=70 THEN GO TO 4000
220 NEXT O
221 RETURN
222 LET O=A+1
223 FOR F=B-1 TO 0 STEP -1
224   PRINT AT 0,F;" "
225   IF ATTR (0,F-1)=70 THEN GO TO 4000
226 NEXT F
227 NEXT A
228 FOR O=A+1 TO 21:LET F=B
229 PRINT AT 0,F;" "
230 IF ATTR (0+1,F)=70 THEN GO TO 4000
231 NEXT O
232 RETURN
233 LET O=A+1
234 FOR F=B-1 TO 0 STEP -1
235   PRINT AT 0,F;" "
236   IF ATTR (0,F-1)=70 THEN GO TO 4000
237 NEXT F
238 NEXT A
239 FOR O=A+1 TO 21:LET F=B
240 PRINT AT 0,F;" "
241 IF ATTR (0+1,F)=70 THEN GO TO 4000
242 NEXT O
243 RETURN
244 LET O=A+1
245 FOR F=B-1 TO 0 STEP -1
246   PRINT AT 0,F;" "
247   IF ATTR (0,F-1)=70 THEN GO TO 4000
248 NEXT F
249 NEXT A
250 FOR O=A+1 TO 21:LET F=B
251 PRINT AT 0,F;" "
252 IF ATTR (0+1,F)=70 THEN GO TO 4000
253 NEXT O
254 RETURN
255 LET O=A+1
256 FOR F=B-1 TO 0 STEP -1
257   PRINT AT 0,F;" "
258   IF ATTR (0,F-1)=70 THEN GO TO 4000
259 NEXT F
260 NEXT A
261 FOR O=A+1 TO 21:LET F=B
262 PRINT AT 0,F;" "
263 IF ATTR (0+1,F)=70 THEN GO TO 4000
264 NEXT O
265 RETURN
266 LET O=A+1
267 FOR F=B-1 TO 0 STEP -1
268   PRINT AT 0,F;" "
269   IF ATTR (0,F-1)=70 THEN GO TO 4000
270 NEXT F
271 NEXT A
272 FOR O=A+1 TO 21:LET F=B
273 PRINT AT 0,F;" "
274 IF ATTR (0+1,F)=70 THEN GO TO 4000
275 NEXT O
276 RETURN
277 LET O=A+1
278 FOR F=B-1 TO 0 STEP -1
279   PRINT AT 0,F;" "
280   IF ATTR (0,F-1)=70 THEN GO TO 4000
281 NEXT F
282 NEXT A
283 FOR O=A+1 TO 21:LET F=B
284 PRINT AT 0,F;" "
285 IF ATTR (0+1,F)=70 THEN GO TO 4000
286 NEXT O
287 RETURN
288 LET O=A+1
289 FOR F=B-1 TO 0 STEP -1
290   PRINT AT 0,F;" "
291   IF ATTR (0,F-1)=70 THEN GO TO 4000
292 NEXT F
293 NEXT A
294 FOR O=A+1 TO 21:LET F=B
295 PRINT AT 0,F;" "
296 IF ATTR (0+1,F)=70 THEN GO TO 4000
297 NEXT O
298 RETURN
299 LET O=A+1
300 FOR F=B-1 TO 0 STEP -1
301   PRINT AT 0,F;" "
302   IF ATTR (0,F-1)=70 THEN GO TO 4000
303 NEXT F
304 NEXT A
305 FOR O=A+1 TO 21:LET F=B
306 PRINT AT 0,F;" "
307 IF ATTR (0+1,F)=70 THEN GO TO 4000
308 NEXT O
309 RETURN
310 LET O=A+1
311 FOR F=B-1 TO 0 STEP -1
312   PRINT AT 0,F;" "
313   IF ATTR (0,F-1)=70 THEN GO TO 4000
314 NEXT F
315 NEXT A
316 FOR O=A+1 TO 21:LET F=B
317 PRINT AT 0,F;" "
318 IF ATTR (0+1,F)=70 THEN GO TO 4000
319 NEXT O
320 RETURN
321 LET O=A+1
322 FOR F=B-1 TO 0 STEP -1
323   PRINT AT 0,F;" "
324   IF ATTR (0,F-1)=70 THEN GO TO 4000
325 NEXT F
326 NEXT A
327 FOR O=A+1 TO 21:LET F=B
328 PRINT AT 0,F;" "
329 IF ATTR (0+1,F)=70 THEN GO TO 4000
330 NEXT O
331 RETURN
332 LET O=A+1
333 FOR F=B-1 TO 0 STEP -1
334   PRINT AT 0,F;" "
335   IF ATTR (0,F-1)=70 THEN GO TO 4000
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337 NEXT A
338 FOR O=A+1 TO 21:LET F=B
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340 IF ATTR (0+1,F)=70 THEN GO TO 4000
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350 PRINT AT 0,F;" "
351 IF ATTR (0+1,F)=70 THEN GO TO 4000
352 NEXT O
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354 LET O=A+1
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```



## Unseasonal Greetings

on BBC Micro

This display program was written to show features available in BBC mode 7 and to illustrate some disadvantages. The program displays a Christmas tree and under the control of a 20-second *Inkey* adds various other graphics and ends with 'Jingle Bells' on three sound channels.

The program consists of three parts, a main stem from 10 to 190, *Progs* from 200 to 690, and data for the music from 700 to end.

*Procl* draws the left-hand branches in

green (*Chr\$* 146) in non-contiguous graphics (to give a fir tree effect) using character 238. Note the backwards loop. Since the characters are drawn one at a time, *L* times, then an increasing loop would put a graphics control character on top of the already printed graphic character, thereby rubbing it out — a very awkward feature of mode 7 graphics.

*Procr* draws the right-hand branches, but does not need the graphics characters 146 and 154 because the line has already been set to these by *Procl*.

*Proct* draws the trunk and *Procb* the box. Note again the backwards loop in

*Procb*. You can try looping it forwards from 1 to 8 (at line 340). The remaining *Proc*'s put on candles, floor, presents and music.

Note that at line 430 non-contiguous graphics is selected for the candles and the use of VDU as an equivalent alternative to *Printchr\$*.

In mode 7 it is not easily possible to have two coloured graphics next to each other because of the screen space occupied by the graphics colour character.

In *Procp* a white ribbon on a blue present is achieved by printing the blue in the background with the white as foreground on top.

```

10 REM XMAS XXXXXXXXXXXXXXXXXXXX
20 REM V02 13.11.82
30 MODE7
35 !&FE00=&10200A
40 *TV255
50 DIMP(4),D(4)
60 FOR B=2 TO 16 STEP 2
70 PROCL
80 PROCR
90 PROCT
100 NEXT B
110 FOR B=16 TO 18:PROCT:NEXT B
120 FOR B=20 TO 23:PROCB:NEXT B
160 W=INKEY(100)
170 PRINTTAB(16,1)CHR#136CHR#131"***"
172 WAIT=INKEY(2000):PROCC
174 WAIT=INKEY(2000):PROCF
176 WAIT=INKEY(2000):PROCP
178 WAIT=INKEY(2000):PROCS1
180 WAIT=INKEY(2000)
190 CLS:GOTO60
200 DEFPROCL
210 FOR L=1 TO B
220 PRINTTAB(17-L,B)CHR#154CHR#146
CHR#238
230 NEXT L
240 ENDPROC
250 DEFPROCR
260 FOR R=1 TO B
270 PRINTTAB(18+R,B)CHR#189
280 NEXT R
290 ENDPROC
300 DEFPROCT
310 PRINTTAB(16,B+1)CHR#154CHR#146
CHR#234CHR#181
320 ENDPROC
330 DEFPROCB
340 FOR Z=8 TO 1 STEP -1
350 PRINTTAB(13+Z,B)CHR#145CHR#230
360 NEXT Z
370 ENDPROC
380 DEFPROCC
390 X=16
400 FOR Z=3 TO 15 STEP 2
410 X=X-2
420 PRINTTAB(X,Z);CHR#147CHR#234:
VDU146
430 PRINTTAB(34-X,Z);:VDU153:PRINT
CHR#147CHR#181
440 NEXTZ
450 ENDPROC
460 DEFPROCF
470 PRINTTAB(0,23)CHR#145CHR#157
480 ENDPROC
490 DEFPROCP
500 PRINTTAB(7,21)CHR#151CHR#252
CHR#252CHR#252CHR#252
510 PRINTTAB(6,22)CHR#147CHR#255
CHR#255CHR#9CHR#149CHR#255CHR
$255
520 PRINTTAB(26,21)CHR#150CHR#157
CHR#151CHR#9CHR#181CHR#9CHR#9
CHR#9CHR#156
530 PRINTTAB(26,22)CHR#150CHR#157
CHR#151CHR#9CHR#181CHR#9CHR#9CHR
$9CHR#156
540 PRINTTAB(27,20)CHR#151CHR#168
CHR#249CHR#248CHR#185
550 ENDPROC
560 DEFPROCS1
570 RESTORE
580 FORT=1 TO 56
600 FOR L=1 TO 3
610 SOUNDL,0,0,1
620 READ P(L),D(L)
630 IF P(L)=0 THEN SOUNDL,0,0,D(L):
GOTO650
640 SOUNDL,-15,P(L),D(L)
650 IF D(L)=6 THEN SOUNDL,0,0,2.5
660 IF D(L)=7 THEN SOUNDL,0,0,15
670 NEXTL
680 NEXTT
690 ENDPROC
700 DATA 145,5,129,5,0,5,145,5,129,5,0,
5,145,10,129,10,0,10,145,5,129,
5,0,5,145,5,129,5,0,5,145,10,129,
10,0,10
710 DATA 145,5,0,5,0,5,157,5,0,5,0,5,
129,7.5,0,7.5,0,7.5,137,2.5,0,2.5,
0,2.5,145,7.5,129,7.5,0,7.5,0,5,0,
5,0,5
720 DATA 149,5,129,5,127,5,149,5,129,5,
127,5,149,7.5,129,7.5,127,7.5,149,
2.5,0,2.5,0,2.5,149,5,127,5,0,5,

```



```

145,5,109,5,0,5,145,5,109,5,0,5,
145,2.5,129,2.5,0,2.5,145,2.5,129,
2.5,0,2.5
730DATA145,5,129,5,0,5,137,5,0,5,0,5,
137,5,0,5,0,5,145,5,0,5,0,5,137,5,
125,5,0,5,157,5,0,5,0,5,149,5,0,5,
0,5,137,5,0,5,0,5
740DATA145,5,129,5,0,5,145,5,129,5,0,
5,145,10,129,10,0,10,145,5,129,5,
0,5,145,5,129,5,0,5,145,10,129,10,
0,10
750DATA145,5,0,5,0,5,157,5,0,5,0,5,
129,7.5,0,7.5,0,7.5,137,2.5,0,2.5,
0,2.5,145,7.5,129,7.5,0,7.5,0,5,0,
5,0,5
760 DATA149,5,129,5,117,5,149,5,129,5,
117,5,149,7.5,129,7.5,117,7.5,149,
2.5,0,2.5,0,2.5,149,5,117,5,0,5,
145,5,109,5,0,5,145,5,109,5,0,5,
145,2.5,129,2.5,109,2.5,145,2.5,
129,2.5,109,2.5
770DATA157,5,125,5,0,5,157,5,0,5,125,
5,149,5,125,5,0,5,137,5,125,5,0,5,
129,5,0,5,0,5,0,5,0,5,0,5

```

Unseasonal greetings  
by S G Poulton

## Fly

### on Spectrum

Instructions for this game are in the program.

Enter lines 1 to 17 (set up user-definable graphics) then Run this to allow the graphics to be established.

#### Program notes

Lines 18 to 51 Sets up variables.

60, 70, 110 and 120

Are responsible for printing the graphics. Although these are written out in full on the listing, in practice, the Spectrum has to be put into Graphics mode and the appropriate letter entered. Checks if the Fly has been caught. Deal with the end of the game and the instructions.

130 260 to 9030

```

1 REM FLY (C) C.LAWSON 6/2/1983
2 DATA 0,43,120,205,7,1,2,6
3 FOR F=0 TO 7: READ T: POKE USR
  "a"+F,T: NEXT F
4 DATA 0,24,60,230,128,128,64,96
5 FOR F=0 TO 7: READ T: POKE USR
  "b"+F,T: NEXT F
6 DATA 0,1,2,28,32,28,1,0
7 FOR F=0 TO 7: READ T: POKE USR
  "c"+F,T: NEXT F
8 DATA 60,194,1,95,130,95,1,254
9 FOR F=0 TO 7: READ T: POKE USR
  "d"+F,T: NEXT F
10 DATA 0,24,32,64,192,128,0,0
11 FOR F=0 TO 7: READ T: POKE USR
  "e"+F,T: NEXT F
12 DATA 0,0,0,7,13,27,10,6
13 FOR F=0 TO 7: READ T: POKE USR
  "f"+F,T: NEXT F
14 DATA 0,0,0,224,160,116,72,96
15 FOR F=0 TO 7: READ T: POKE USR
  "g"+F,T: NEXT F
16 DATA 192,113,126,4,12,50,97,192
17 FOR F=0 TO 7: READ T: POKE USR
  "h"+F,T: NEXT F
18 LET H=99
19 LET C=0
20 LET J=3
30 LET K=15
40 LET X=0
50 LET Y=0
51 LET M=100
54 PRINT AT 10,6:"DO YOU WANT INSTRUCTIONS?":INPUT A$
IF A$="Y" OR A$="YES" THEN GOSUB 9000:CLS
55 BEEP .5,0:BEEP .5,0:BEEP .25,1:
  BEEP .1,5:BEEP .01,4:BEEP .1,3:BEEP .01,2:BEEP .5,1
60 PRINT AT Y,X:"(user definable a,b)"
70 PRINT AT J,K:"(user definable c,d,e)"
80 GOSUB 100
90 IF INKEY$<>" " THEN GOSUB 230
100 CLS
110 PRINT AT Y,X:"(user definable f,g)"
120 PRINT AT J,K:"(user definable h)"
130 IF INT (X+.5)=K-1 AND (Y+.5)=J THEN GOTO 260
140 GOSUB 180
150 CLS

```

```

160 LET C=C+1:IF C>M THEN PRINT AT 8,2:"YOU HAVE DIED OF STARVATION":
  PAUSE 100:GOTO 260
170 GOTO 60
180 LET X=ABS (X+4*RND-2)
190 LET Y=ABS (Y+2*RND-1)
200 IF ABS X>20 THEN LET X=20
210 IF ABS Y>8 THEN LET Y=8
220 RETURN
230 LET K=K+(INKEY$="B" AND K<20)-
  (INKEY$="5" AND K>0)
240 LET J=J+(INKEY$="6" AND J<8)-
  (INKEY$="7" AND J>0)
250 RETURN
260 IF H>C THEN LET H=C
270 PRINT AT 21,0:INK 1:"TIME TAKEN=":
  C: AT 21,15:"HI-SCORE=":H
280 PRINT AT 14,8:"DO YOU WANT ANOTHER GO?":INPUT A$:IF
  A$="Y" OR A$="yes" THEN GOTO 19
290 STOP
9000 CLS:PRINT AT 0,10:INK 1:"THE FLY":OVER 1:
PRINT AT 0,9:"(9* symbol shift 0)"
9010 PRINT AT 2,2:"You have been transformed into":PRINT:
PRINT "a rare bird & have been placed ":
PRINT:PRINT "on an island where food is ":PRINT:
PRINT"scarce.You have found a juicy ":PRINT:
PRINT "fly,but it is smart and dodges
9015 PRINT:PRINT "you.Using the cursor keys steer ":PRINT:
PRINT "yourself to a feast!"
9020 PRINT:PRINT " However you only have a limit":PRINT:
PRINT "ed amount of energy.Therefore ":PRINT:
PRINT "you are racing against time!"
PRINT AT 21,8:"GOOD LUCK":
OVER 1:PRINT AT 21,7:"(11*symbol shift 0)"
9030 PAUSE 1500:RETURN

```

Fly  
by Carlton Lawson



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ble FOUR sectors with missile  
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# OPEN FORUM

## Target

### on Spectrum

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the screen. Your sight starts in the centre; position it over the enemy ship and press the 0 key to fire your laser. If you hit it a victory roll is played and another ship will appear. This goes on until your time is up (you have two minutes).

Both your score and time are displayed on the screen throughout the game.

#### Program notes

- 1-40 Set up variables
- 100-999 Main loop
- 1000-1060 Subroutine for if you press a key
- 2000-2050 Subroutine for if you
- 3000-3090 Subroutine to move alien
- 4000-4020 Subroutine for if you hit an alien
- 5000-5210 Subroutine to set up user defined graphics
- 6000-6310 Time up routine
- 7000-7300 Instructions

```

1 LET h=0
5 LET s=0
10 GO SUB 5000
15 GO SUB 7000
16 POKE 23674,0
17 POKE 23673,0
18 POKE 23672,0
20 INK 0: PAPER 4: BORDER 2:
CLS
30 LET b=1
40 LET x=15: LET y=15
50 GO SUB 2000
60 GO SUB 3000
100 IF INKEY$="" THEN LET
a$=INKEY$: GO SUB 1000
105 LET b=2
110 IF RND>.17 THEN GO SUB
3020
120 IF INKEY$="0" THEN BEEP
.2, .50: IF x1=x AND y1=y
THEN GO TO 4000
150 LET t=INT (((PEEK 23673)
*5) + ((PEEK 23672) *50))
160 PRINT AT 0,0: INVERSE 1:
"SCORE=";s
170 IF t=100 THEN FLASH 1
180 PRINT AT 0,10: "TIME LEFT
="; 120-t; " SECONDS "
200 IF 120-t<=0 THEN GO TO
6000
999 GO TO 100
1000 GO SUB 2000
1010 IF a$="8" AND y<29 THEN
LET y=y+1
1020 IF a$="7" AND x>1 THEN
LET x=x-1
1030 IF a$="6" AND x<19 THEN
LET x=x+1
1040 IF a$="5" AND y>2 THEN
LET y=y-1
1050 GO SUB 2000
1060 RETURN
2000 OVER 1
2010 PRINT AT x-1,y: "C"
2020 PRINT AT x,y-1: "B B"
2025 PRINT AT x+1,y: "C"
2030 OVER 0
2050 RETURN
3000 LET x1=INT (RND*13+1)
3010 LET y1=INT (RND*29+1)
3015 IF b=1 THEN GO TO 3030
3020 PRINT OVER 1: AT x1,y1: "A"
3030 LET v=INT (RND*4)+1
3040 IF v=1 AND x1>4 THEN LET
x1=x1-1
3050 IF v=2 AND x1<18 THEN LET
x1=x1+1
3060 IF v=3 AND y1>3 THEN LET
y1=y1-1
3070 IF v=4 AND y1<28 THEN LET
y1=y1+1
3080 PRINT OVER 1: AT x1,y1: "A"
3090 RETURN
4000 FOR j=-30 TO 50: BEEP .03,
j: NEXT j
4010 LET s=s+10
4020 GO TO 20

```

```

5000 POKE USR "a",66
5010 POKE USR "a"+1,153
5020 POKE USR "a"+2,189
5030 POKE USR "a"+3,255
5040 POKE USR "a"+4,255
5050 POKE USR "a"+5,189
5060 POKE USR "a"+6,153
5070 POKE USR "a"+7,66
5100 FOR l=0 TO 7: POKE USR
"c"+l,24: NEXT l
5200 FOR l=0 TO 7: POKE USR
"b"+l,0: IF l=3 OR l=4
THEN POKE USR "b"+l,255
5210 NEXT l
5300 RETURN
6000 DATA 0,6,9,15,9,6,0
6010 LET y=.001
6020 FOR n=-20 TO 40 STEP 6:
RESTORE
6030 FOR k=1 TO 7: BORDER k:
READ x: BEEP .04,x+n
6040 NEXT k: NEXT n: BEEP 2,
0+n-1
6050 FOR n=40 TO -20 STEP -3:
RESTORE
6060 FOR k=1 TO 4: BORDER k:
READ x: BEEP .04,x+n
6070 NEXT k: LET y=y+.002:
NEXT n
6090 PAUSE 150
6100 CLS
6110 IF s>h THEN LET h=s:PRINT
"CONGRATULATIONS YOU HAVE
GOT THE HIGHEST SCORE
TODAY OF "h
6200 PRINT FLASH 1: "DO YOU
WANT ANOTHER GAME (y/n)"
6300 IF INKEY$="" THEN GO TO
6300
6310 IF INKEY$="y" THEN GO TO
5
7000 PRINT TAB 10: "INSTRUCTIONS"
7010 PRINT
7020 PRINT "The idea of the
game is to shoot down as
many aliens (A) as you
can in 2 minutes "
7030 PRINT
7040 PRINT TAB 12: "CONTROLS"
7050 PRINT
7060 PRINT "Use the cursor
keys (5,6,7,8) to move
your sight around and the
0 key to fire"
7070 PRINT
7080 PRINT "PRESS ANY KEY TO
CONTINUE"
7090 CLS
7100 INPUT "ENTER SKILL LEVEL
(1 TO 5 ,5 EASY)";c
7300 CLS: RETURN

```

Target  
by Robert Kirkland



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## Tony Bridge's Adventure Corner



### Three golden rules . . .

Now we are getting to the nitty-gritty of Adventuring! You have just purchased your latest adventure tape, and loaded it into the computer — you are staring at the screen wondering how to answer the first prompt.

Most programs of the traditional text variety will describe the location, which is usually outside a hut on the edge of a forest, outside a castle or some other variation. Next comes the prompt: "What shall I do next?" Your first reaction may well be to instruct the computer to dash off into the surrounding landscape — you naturally want to get your hands on all that lovely Treasure, or fight Dragons. *Don't!* Almost without exception, that building, hut, castle, spaceship or whatever it is in the opening preamble, is there for a purpose.

This is the first golden rule of computer adventuring: *Nothing exists without a purpose.* Memory space is too tight to allow objects to just sit there without contributing something to the game (although I often wonder what use the Golden Key, in the *Hobbit*, can be put to!)

So, enter the building, or whatever it is, at the start. It's a good bet that if the author has written a traditional monster-bashing fantasy, you will find a sword, or other weapon, and food and drink. You may be tempted, at this point, to eat and drink — OK, but remember our first golden rule, and don't discard the empty containers. You may bet your last gold piece that they will be needed later in your adventure (and we will have a look later at one particularly clever use that these old cans and bottles may be put to). And this brings us to our second golden rule of adventuring — pick up everything that you can. Like all good rules, however, this one has its exceptions.

If the author/programmer is of a devious frame of mind, he will have stuck in a few surprises. In *Sorcerer's Castle*, for example — which is a particularly good adventure of the traditional kind — various objects are left lying around, inviting the adventurer to pick them up. You may open a book and find it stuck to your weapon

hand, or a chest, on being opened, will explode in your face. Thus, the third golden rule of computer adventuring is really a corollary of the first, and an amendment of the second — whilst everything has a purpose, said purpose may be sinister, so use caution when picking up objects!

But now to some of your letters. Bob Franklin of Southampton (a lot of computer freaks down there for some reason), writes about the *Hobbit*, and his experiences with the program. Bob has found an ingenious short-cut back home with the treasure, which gets you there and back using only 50 percent of the adventure. He also wonders, as I too mentioned earlier, what use the Golden Key can be put to. Several others have asked the same question, so if anyone can enlighten us, please let me know.

On the subject of scores in the *Hobbit*, Paul Vale of Storrington has gone to the other extreme and completed 77.5 per cent without, apparently, collecting the treasure — which goes to show how rich this adventure can be.

Bob Franklin has several interesting points to make — he mentions some of the little bugs that many of you have written about, such as the difficulty in Saving an unfinished game, and that annoying habit the program has of whisking away the information just as you are thrown into the dungeon again! But he goes on to say: "... Otherwise, I rate *Hobbit* highly. Nothing else I've seen approaches it for sheer

fun except perhaps *Pi-man* . . .

"I'm very disappointed in *Inca Curse* for the simple reason that the spelling is so atrocious. It seems silly to spoil an adventure with sloppy presentation which five minutes with a dictionary would have cured. (Couldn't agree more, Bob, and we're being charged good money for these tapes and many others like them. Surely the authors could take just a little more time to polish up the finished product . . . TB)

"*Sorcerer's Castle* is the best of the straight D&D adventures I've found . . ." Again, I can only agree, and I will have a closer look at this interesting program in a later issue.

In the meantime, remember what Dracula said when brought to England — "wherever I hang my bat is Home!"

● On the subject of *Hobbit* scores, we would be interested to hear who has succeeded in bringing back the treasure with the lowest percentage. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

## Cruising & Blind Alley

### Cruising

First there was *Space Invaders*, then there was *Pacman* — now there is *Cruising*. This all-action, machine code, arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

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*Popular Computing Weekly* is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

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Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 8442 from Glenn Fuller of Farnborough, Hants. If you have a higher score, you could still win this month's £10 — but hurry, entries close on April 30.

### Notes

- 1) Each entry must consist of a ZX printout and your name and address.
- 2) Closing date for this month's *Cruising* challenge entries is April 30.
- 3) The highest score each month will receive £10.
- 4) High scores cannot be transferred from one month to another.
- 5) The judges' decision is final.
- 6) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

### Blind Alley

*Blind Alley* is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But, watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address to:

*Popular Computing Weekly*  
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The highest score sent in so far is 6465 from Antony Gregory of Crawley, W. Sussex. Entries for this month's competition close on May 31.



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## SPEEDED UP!

Anthony Lawler of Shelley Drive, Bletchley, Milton Keynes, writes:

**Q** I have recently acquired a Dragon computer and as I am used to the much faster BBC I am finding it very slow. To try and speed up my programs, I am thinking of trying to learn machine code for the 6809. Can you recommend any good books on the subject? Further, do you know whether the 6809 accepts the same machine code as the 6502?

**A** The only book that I have looked at on the 6809 is by Lance A Leventhall — *6809 Assembly Language Programming* — published by Osborne/McGraw Hill. The ISBN is 0-931988-35-7, and it costs £11.95. I would suggest that you try to get a copy through your library.

The machine code for a 6502 is not the same as for the 6809. The chips do have a common root, but the 6809 is a refinement of the 6502, as indeed is the whole of the 6800 series.

## AMERICAN RELEASE

Tim Ward of Derby Road, Rugby, writes:

**Q** I actually live in America and I hope to buy a Sinclair Spectrum over there when Timex release it. Do you know if the Timex will be compatible with the Pal version for hardware? I know that the clock speeds will be different, and that I must change *Pause* from multiples of 50 to multiples of 60 to the second, but will this make any difference to the hardware side?

Also, when is Softek going to make a compiler for the Spectrum that includes floating point, arrays and strings?

**A** Until we actually get hold of the American

version of the Spectrum (the Timex Sinclair 2000) it is impossible to be absolutely positive on these things. However, I would doubt that much of the hard and software available over here for the Spectrum will be compatible with the Timex. The Timex version is planned to have several important differences from the Spectrum that we know and love.

It will have an added Rom slot and a speech chip built in. This may sound like a major improvement, but it will be done at the expense of the In/Out Commands, which will make control of some peripherals much harder.

Additionally, as you say, the timing will probably affect the software as well. There is an interrupt every cycle for a frame count, this will mean 10 interrupts more per second on the American version, than on our version. Again, only actual testing will reveal what effect this would have on individual programs, but it is quite likely to make at least some incompatible.

I do not know when or if Softek is going to uprate its compiler, but I suggest that you look for an American version, when you have your Timex 2000.

## ALL THE PINS

Luke Oatham of Baldwins Hill, Loughton, Essex, writes:

**Q** I have had a Vic20 since October 1982 and all the Rom cartridges that I have bought have had a full row of pins on the back. Recently, I purchased *The Count* by Scott Adams. It is an adventure game, but it does not have all the pins. Is the row of pins meant to be incomplete?

**A** The simple thing to do is to see if the program Runs. Unless the cartridge is a motherboard, or is designed to accommodate further cartridges, it is very unlikely that it will use all the data lines available. Different add-ons make different uses of the computer and obviously they will only use the particular data lines that they need. In a cartridge (were you to take one apart, which I do not suggest), you will find that although it might have every data line on the outside, on the

internal pcb there will be some lines that just finish as dead ends. This is true of many computers and their expansion ports.

## WHAT IS IT?

Arthur French of Roehampton Vale, London SW21, writes:

**Q** I have sometimes seen mentioned phrases such as 'MOS technology' and 'MOS chips'. Is MOS a company or what? There is no specific reason why I should know, it is just one of those niggling things that is bugging me.

**A** Yes, MOS is a company, but MOS actually stands for Metal Oxide Semi-Conductor. It is this technology that has done much to aid the 'micro revolution'. When referring to a single gate it describes the three layers that make up that gate. A MOS gate looks like:

Gate Terminal  
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MOS technology is the use of a great many of these gates close together. Because of their structure there is much less power dissipation than previously. This allows much larger circuits and much easier heat dissipation.

## UP AGAINST THE WALL

John Shilai of Corbyn Street, London N4, writes:

**Q** At a recent microfair I bought a Kempston joystick. Although there are adequate instructions on implementing joystick commands from a Basic program, I am stuck with a good game (*Tobor*) that has the control keys in absolutely ridiculous positions — a game that I think would be improved with joysticks.

The problem is that *Tobor* is written totally in machine

code, and autoruns, therefore I cannot get at the listing to change it for joysticks. I am up against a wall and really stuck. The only thing I can think of is to *Poke* the keys to port 31 (the one to which the joystick is mapped), but I am not sure of how to do this. Can you help?

**A** The Kempston joystick, unlike most others which emulate the cursor keys, works on the Input/Output ports. What you need to do is change the translation that goes on between the value of the port and the key that is pressed.

However, this is the sort of question you would probably be better off addressing to the relevant software house. In this case, a listing of *Tobor*, or those parts which deal with the cursor keys, is necessary.

## NOT TESTED!

Anthony Silver of St James Close, Prince Albert Road, London NW8, writes:

**Q** I am the owner of a 48K Spectrum and I am desperately searching for a suitable Centronics interface. I am willing to pay for it, even if it is still in the design stage. My only requirement is that it can handle the full Ascii character set, graphics do not matter so much. If you or one of your readers can help I would be very grateful.

**A** By the time you read this, Kempston should have one on the market. For further details contact Kempston Micro Electronics, 180a Bedford Road, Kempston, Bedfordshire MK42 8BL.

I think this letter is important, for more reasons than the fact it shows the increasing versatility of the Spectrum. I fully appreciate that some people have a very great need for a particular peripheral. What worries me is that this is just the sort of customer response that gets manufacturers putting goods on to the market before they have been properly tested.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*



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### DRAGON MACHINE CODE

Toolkit 9 combines MEMSCAN with a machine code disassembler PLUS a machine code loader, all in one powerful program. Buy at low introductory price of only £7.50 direct from the originators. SAE for details or cheques to CHASE COMPUTERS, 7 Old Acre Lane, Brocton, Stafford ST17 0TW

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### 16K SPECTRUM

Upgrades 48K for issue two machines, no soldering required, kit of ICs £23.50 inc VAT, p&p, or send me your issue two Spectrum for upgrade, £27.00 inc VAT, p&p. Mail Order only by return to: J. C. Brewer (Dept PCW, 7 Roseberry Terrace, Kirkcaldy KY1 1DW.

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64 Programmers Ref Manual £15.95  
Tel Chris Gurney, Dave Walsh or Floyd Paterson  
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189 Freston Rd, London W10 6TH  
or cheques P/P (add 15% VAT and £8 for p&p Securicor delivery)  
Prestel Frame 4820000 (a) for latest software and hardware information and prices.

**DUST COVERS** available for any computer, printer etc., BBC, TI, Epson, £3.95. Dragon, Atari, Vic20, £2.95. Sharp MZ80AK, £4.95. For others please phone or write to Sherborne Designs, Victory House, 8A The Bank, North Bradley, Trowbridge, Wilt. Tel: 02214 4425. Also made to measure service. Dealer enquiries welcome. Access and Barclaycard.

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**TEXAS 99/4A COMPUTER**, joysticks, 3 months old, 6 game cartridges, cassette leads, Teach Yourself Basic cassette, £200 — will split. Tel: 01-836 2351 (after 8 pm).

**TRS80 LEVEL 2 16K** plus VDU, cassette, manual, books and software, £200.00. Tel: Letchworth 2177.

**CASSETTE LABELS PRINTED**, self-adhesive, any amount, Sae samples. Six-Jays, Swanpool, Falmouth, Cornwall.

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Sunday, 24 April, 11 am-4 pm

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Admission: Adults 30p  
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**ATARI VCS** + 6 cartridges including Missile Command, Space Invaders, £130 ono. Tel: Durham (0385) 69303.

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Original machine code and arcade quality games, utility programs, educational and business software for Vic20, ZX81. Spectrum, BBC and Acorn. Best prices paid for copyright purchase.  
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## Commodores for sale

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**VIC20** + Vic revealed + programmer's reference manual + 2 books. Spiders of Mars Rom game and EMI Music Composer + Super Slot, for £130 or sell separately. Tel: 739 9061.

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**VIC20 16K TAPE DECK**, adv. Rom, books, tapes + software, perfect condition, £220 ono. Tel: Coventry 464732 (4 pm).

**VIC20 CARTRIDGES**, Avenger and Jelly Monsters, £15 each. Tel: Stoke-on-Trent (0782) 516235.

**VIC20** + cassette deck + 16K + 3K Ram + 250 books, £100 software, cover, joystick, all in excellent condition, £250 ono. Tel: (0203) 463998.

**VIC20 + CASSETTE**, 8K Ram + 3K super expander + 10 cartridges including 8 Scott Adams cartridges and Omega Race etc + £800 of software, originally £1,335, give away for £550. Tel: 01-387 8751 (after 6 pm).

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**4000 SERIES PET**, with printer, dual test drive cassette player, sound box, books, software, cassettes and discs, recently bought, £1,600 ono. Tel: 346-5014 (evenings).

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**VIC20 COMPUTER** + C2N tape recorder and Basic programming book 1 and some tapes, 4 months old, boxed and complete, £125. Tel: 01-500 8608.

**VIC20** with cassette recorder and lots of software and cartridges and books, £500. Tel: Bournemouth 515410.

**VIC20** + cassette unit + 16K + software, cost £370, will accept £240 ono, will split if necessary. Tel: 0423 500423.

**VIC20** + cassette (7 months guarantee), joystick + over £180 software + books, £160 ono. Write to: G. Reynolds, 3 Paddenswick Road, Hamersmith, London (inc. Tel: No.).

**VIC20**, Sargon Chess, 3+ 16K Ram, Vic Revealed, programmers ref. £170 ono. Tel: 0732 361920.

**VIC20** software, Meteor Run, Cloud Burst (cartridges) + 3 cassettes, Alien, Frogger, Amok. Any reasonable offer accepted. Tel: Nottingham 703604 (after 6 pm).

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**SWAP VIC20 CARTRIDGE GAME**, Mission Impossible for Voodoo Castle or Count Dracula. Telephone 01-515 4696.

## Acorns for sale

**BBC PROGRAMMES** on discs, swap? Are you interested? Tel: 0403 731650, 6 to 9 pm.

**SWAP ACORN** soft games for other BBC Acorn soft games. Tel: 0482 849517.

**BBC MODEL A**, 32K Ram, 6522 VIA + around £100 software, £285. Tel: 0742 306275, around 4 pm.

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**ATARI 400**, 1941 tape, swap for other tape or cartridge or for £12. Tel: 01-989 8138 (6 pm).

**ATARI VCS** with three cartridges, Asteroids, Defender, Missile Command and Intellivision system with 3 cartridges, Look and Chase, Space Battle and Soccer, worth £300, want BBC Model A. Tel: 01-698 9604 (any time).

**ATARI VCS CX2600** machine with one game, £70 ono. Telephone 01-397 3348 (after 4 pm).



**ATARI 800 SYSTEM**, disc drive, cassette, 90 discs, contains 100 Arcade games + many other powerful programs + info. 5 month old, offers, may split. Tel: Warwick 402112 (7 pm—11 pm).

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**ATARI VCS**, 24 cartridges, £250 ono. Tel: 03745 52061.

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**ATARI 400** program recorder, programmer literature, lots of software, Defender, Frogger + sub-Commander, joystick including point master, £370. Tel: Byfleet 46448 evenings.

**ATARI VCS**, seven cartridges including Indy 500, Missile Command, Pinball Casino, cost £225, sell for £140. Tel: 855 9604 after 6 pm.

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**ATARI 48K** program recorder + joysticks + software, £420. Tel: 021-357 73235.

**ATARI 32K** with joysticks, cassette + manuals, large amount of software. Offers. Tel: 0533 714737, after 6 pm.

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**ATARI VCS**, excellent condition, including Combat, Missile Command + video pinball cartridges, £95 ono. Tel: Mablethorpe 3686, after 6 pm.

**ATARI VCS** 6 cartridges including Defender, Pacman and Missile Command, 6 months old, £120 or swap for Spectrum. Tel: Bracknell (0344) 23443, after 6 pm.

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**32K TRS80** level II model 1 + VDU + cassette recorder + over £100 software + £40 books + catalogues, £350 ono. Tel: 021-742 1446 (after 6 pm).

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**DRAGON 32** with software, joystick + tape recorder, worth £350, accept £210. Tel: Hull 0482 831 724.

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**TWIN SET** of Apple disc drives with control card, dos disc + manual + 2 blank discs. Only been used once. £450 ono. Tel: 051-9223639.

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**VIC CARTRIDGES FOR SALE**, games + adventures. All offers considered, £160 the lot or sell individually. Call Joel 08956 38564.

**INTERVISION CARTRIDGES**, including Utopia, £10 each. Tel: 643569 Bristol. Daru Tower computer game, £13.

**TEXAS T199/4A**, Cable, Munchman, Space Invaders, cassette recorder, software, manuals, £180 ono. Tel: 061-338 2350 (6 pm).

**SWAP DRAGON 32 QUEST** + Carixto Island with other adventure games. Tel: Exeter 59128 (6 pm).

**NASCOM 2 16K MEMORY**. Tel: 01-950 1524. £300.

**VIC20**, unexpanded, Jackpot Fruit machine, 4 reels, hold, sound + large graphics, just £3.99. Phil Macdonald, 43 Freshwater Drive, Hamworthy, Poole, Dorset.

**CHESS COMPUTER** for sale, can solve mate in seven, has official rating of 1771, mint condition, cost £170, will sell for £140. Tel: Doncaster 49475 (before 5 pm).

**CHEAP GAMES**. Send no cheques. First come, first served: Vic20 Road Race, £4.00; number Invaders, £4.00; Crossfire, £5.50; Electric Mind, £2.50; Car Drive, £2.50; 8K Ram Pack, £37; ZX81 Fighter Pilot, £3.00; 16K Ram Pack, £29. M. A. Valentine, 101a Underdal Road, Monkmoor, Shrewsbury, Shropshire SY2 5EF.

**CHESS COMPUTER**, 14 months old, 10 levels, Beginner II, solves chess problems, also rechargeable battery choice, £100 ono, or swap for Spectrum, 16K. Mr J. Hill, 46 Hexal Road, London SE6.

**PET 32K**, new Rom, large keyboard and cassette player, recently overhauled, 60 games, business and scientific programs, programs worth £250 and include Chess, Defender, Scramble and Compiler. Any reasonable offers. Tel: 01-727 9209 (after 6 pm).

**ALIEN CARTRIDGE** for Vic20, new, almost unused, £15. Tel: Redditch 24340 (after 6 pm).

**SUPER EXPANDER** for Vic20, 6 months old, hardly used, £28 ono. Tel: 01-866 6321.

**INTELVISION CONSUL**, £65, Inteleview unit, £35, cartridges including B17, Spartans, Tron 2 etc, from £10. Tel: (0449) 626238.

**T199/4A** with extended Basic plus two cartridges, cassette player and leads, £200 ono. Telephone 021-554 7013 evenings and weekends.

**DRAGON 32**, 6 months old, still under guarantee + 20 software, £160. Tel: Luton 26619.

**DRAGON 32**, Ghost Attack + Meteoroids, cartridges + cassette software to sell or swap. Tel: 021 3269501.

**DRAGON 32**, joysticks, all leads, lots software and tape recorder, worth £310, sell for £250. Tel: 043-871 4390.

**JUPITER ACE**, 3K Ram manual and cassette leads, mains adaptor and 5 programmes, £70. Tel: Conroy 2345.

**VIC CARTRIDGE**, Jelly Monsters, The Count + The Alien, £15 each. Tel: 0962 53240.

**GAMES CARTRIDGE** for VIC20. Pirates Cove, two months old. Tel: 952 4749 after 4.30.

**CB** with microphone + aerial in good condition, swap for ZX81 with Ram pack. Tel: Leyland 34106.

**MATTEL INTELVISION** video game + 16 cartridges, £200 ono. Tel: Bristol 649 441.

## Wanted

**WANTED**, 48K Spectrum, £160 ono. Tel: 010-323 234 3154 (6 pm).

**WANTED**. Vic disk drive with disks, pay around £150. Tel: 01-840 3610.

**WANTED**, ZX printer to borrow, in exchange for printer paper — Newbury area. Tel: (0635) 44625 (after 4 pm).

**WANTED**, Pet 2000, with discs, £150 + discs. Tel: 01-734 8907 (daytime).

**VIC20**, 8K Ram, £30. Tel: 574-4122.

**DRAGON 32s REQUIRED**, £110 awaits each sound machine, decision by return post, details to: A. Ellis, 22 Turnavean Road, St Austell, Cornwall PL25 5NX.

**VIC20** + cassette unit, £100-£200, must be still under guarantee. Tel: 04862-70318.

**WANTED**. ZX81, £25 or swap with record deck. Tel: Reading (0734) 413647.

**WANTED**. Spectrum or ZX81 system. Will swap for double stereo system with four speakers. Telephone 05827 66053 (Harpenden).

**WANTED URGENTLY**, 48K Sinclair Spectrum, must be in excellent condition, will swap for photocopy two paper, worth over £200. Tel: Sittingbourne 73912.

**SPECTRUM** computer, up to £100 offered. Dave, 138 Marsden Road, Blackpool, Lancs, FY4 3DU.

**VIC20** + cassette recorder in price range of £100-£200, still under guarantee. Tel: 04862-70318.

**ACORN** system 1, CPU board, urgently wanted. Working or faulty. Tel: 021 458582 (evenings).

**WANTED: SUPER EXPANDER** for Vic20. Tel: Leatherhead 373370.

**WANTED: BBC MODEL** for B (anywhere in country), will pay £250 for Model B or £200 for Model A. Tel: Leyland 34106 to make arrangements.

**WANTED**: ZX81 16K with manuals and leads. Telephone 01-505 1720 after 4 pm.

**WANTED**: Texas T199/4A. Chesham 772544.

**4-SLOT MOTHERBOARD** for Vic20, made by Stack Computers, fits directly into Vic20. Tel: Lichfield (05432) 53344.

**ZX80**. Tel: York 769025.

**WILL SWAP** AIWA personal cassette player + inside basic games for Vic super expander. Tel: Reading 302131.

**WANTED**: BBC Model B. Tiverton 258412.

**ACORN** soft BBC software, will swap for monsters/arcade, action + asteroids. Tel: Cobham, Surrey. 3516 after 4.30 pm.

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# NEW RELEASES

## DOCTOR WHO?

*Time Lords* is described by its makers as a "five-person five-dimensional game". It is a *Dungeons and Dragons* type game, where winning is a matter of subtle tactical decisions.

In this game, for BBC model B, you are a time lord and must influence the outcome of history in your favour. There are no lasers or bombs, only various kinds of scanners which reveal information about the state of different parts of the universe.

While a single-player game is quite possible, the program is really designed for up to five people to battle it out.

It should appeal to those who enjoy playing the more traditional games in this genre as well as aspiring Machiavellis everywhere.

**Program**  
**Price**  
**Micro**  
**Supplier**

*Time Lords*  
£7.95  
BBC B  
Red Shift  
12c Manor Road  
Stoke Newington  
London N16

## SPACE TACTICS

Abacus, a company whose *Avenger* for Spectrum sold over 40,000 copies, has issued

another arcade-style program.

*Sentinel* is described as an "entirely original" machine code game. You have five space stations protected by four ships. You have to protect your stations from the aliens, using the ships which fire guided missiles and photon cannon.

An interesting feature is that the tape contains two versions, the second being for more advanced players. Success depends on the length of time survived rather than the number of hits, and so a fair degree of tactical thinking is required.

**Program**  
**Price**  
**Micro**  
**Supplier**

*Sentinel*  
£5.00  
Spectrum 16/48K  
Abacus Programs  
186 St Helen's Avenue  
Swansea

## THE WORM TURNS

In *Mined Out*, Bill the worm (star of *Worm Without A Cause*) is trapped in the mine fields along with his leading lady Nora Mudroe — well, several Nora Mudroes to be exact.

Your task is to rescue both Bill and Nora(s) from the mines, without being blown up yourself. An original concept which could appeal to those

who enjoy quirky arcade-style games.

Versions are available for both the Dragon and the Spectrum.

**Program**  
**Price**  
**Micro**  
**Supplier**

*Mined Out*  
£5.95  
Dragon 32/Spectrum  
Quicksilva  
Palmerston Park House  
13 Palmerston Road  
Southampton SO1 1LL

## MUSICAL MICRO

### THE BBC MUSIC PROCESSOR



Latest release from Quicksilva is a Music Processor for the BBC computer. It is claimed to enable the BBC to be used like a synthesiser, plus 4-track recorder and editing desk.

The complicated instruction booklet demonstrates how to design sounds, select channels and play notes using the keyboard. A number of different instruments can be mimicked.

The reverse side of the tape includes a number of music files which can enable your micro to dazzle you with Bach's Brandenburg Concerto or serenade you with a selection of carols.

If you wish, the program will also supply you with a selection of weird noises and Human League impressions.

**Program**  
**Price**  
**Micro**  
**Supplier**

*Music Processor*  
£14.95  
BBC A or B  
Quicksilva  
Palmerston Park House  
13 Palmerston Road  
Southampton SO1 1LL

## NO RESTAURANT!

Those who loved either the book, radio series, records or tv production of *The Hitchhikers Guide To The Galaxy* can now play the adventure game.

You are an Arthur Dent

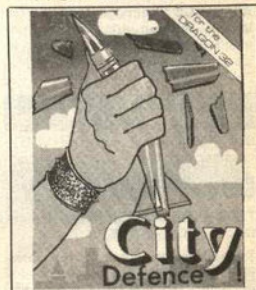
type of adventurer, although seemingly less naive and innocent since your objective in the game is to collect treasure. The game features characters and places well known to *Hitchhikers'* many addicts, although apparently no *Restaurant At The End Of The Universe*. You will obviously have to eat in less dramatic surroundings.

Although text only, the name alone should ensure this game is a success. The game was first issued for the Commodore 64, but versions for the Vic20 and Dragon are also planned. Expect other versions soon.

**Program**  
**Price**  
**Micro**  
**Supplier**

*Hitchhikers Guide To The Galaxy*  
£13.80  
Commodore 64  
Supersoft  
Winchester House  
Canning Road  
Wealdstone, Harrow  
Middlesex HA3 7J5

## HOME GUARD!



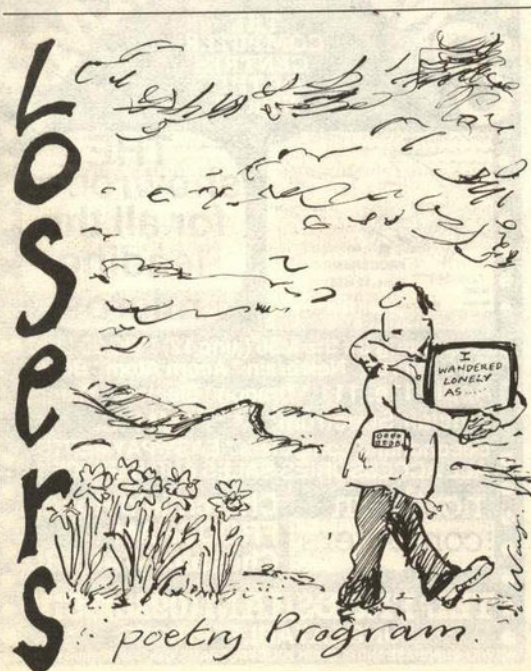
*City Defence* from Shards Software is a version of the popular arcade game. Like the arcade original the idea is that you try to destroy the missiles before they obliterate your city.

The game requires one joystick and costs £5.75.

**Program**  
**Price**  
**Micro**  
**Supplier**

*City Defence*  
£5.75  
Dragon 32  
Shards Software  
10 Park Vale Court  
Vine Way, Brentwood  
Essex CM14 4UR

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF.





## Ziggurat



## The four C's . . .

Last week I proposed a new system of software evaluation — what I call the CO4 criteria — Communication, Computation, Co-ordination and Constitution!

Communication between the user and the program is always very important, for a game it can be a key consideration.

I remember reviewing a cartridge for the Vic20, and the controls — for a road-racing game — were so complex that it took two of my panel of reviewers to operate them adequately. One person took control of changing gears and the other steered.

In essence, when considering communication we study how the user controls what happens. We also study the type of communication: keys, joystick, or paddle, and whether the mode of input detracts from the rest of the game. Though it is possible to produce exciting games for any computer, an intelligent mode of input — one that does not require a degree in ergonomics from the user — certainly helps.

Computation is concerned with the way in which the program's results are obtained. For example, it is rare these days for an arcade-type program to be written in Basic. Not very long ago, machine code was frowned upon by "respectable" computer scientists — I have seen space invaders who doddle across the screen, at a speed only matched by some computer manufacturers in answering complaining letters. Things are different now.

In essence, when we consider computation, we ask ourselves whether the language and the way in which the program is written are adequate to the task. How to evaluate this factor is not certain — it might be expressed on a scale from 1 to 99, but would the number actually mean anything?

Co-ordination relates to the way the program as a whole is organised. Do the various ele-

ments which compose the program have a coherence? In some (so-called) adventure programs the rationale seems to be "keep on putting lots of little, spurious tasks in the way of the user, and that'll keep 'em happy".

There was one program I remember which was split into two co-ordinated parts: the first part consisted of an over-rated "business game" (all that was required to win was negative gambling stakes); and the second part was a completely unrelated voyage to some foreign land.

Some of the best programs are successful because they are so well co-ordinated. The original *Pac-man* was a well co-ordinated program, and this is why it was so successful. Having seen many imitations (as we all have) one could ask how many are so well inter-related? With the advent of super-graphics games (almost space-flight simulations), the importance of co-ordination becomes ever more crucial.

*Constitution* is concerned with the ideas behind the game. We read that new software houses promise "totally original games", but when we examine the games, the frog has become a skier has become a dawdler has become a tacky tickler.

There are certain fixed styles of game, and most of the present computer games are simple variants on these fixed styles. The main differences now seem to come from the speed of the graphics — Dragon Maze became *Pac-man* and Lem became *Lunar Lander*; and so on for most of the other games around.

The success of such a CO4 evaluation system could be gauged by whether the person studying the game finds it helpful. If we start to look at, say, *Constitution* we begin to have to classify types of constitution — this is a *Vaders* game, this is a *Maze* game, this is a *King* game, and so on.

What is perhaps more important is that it forces us to actually think: What is this game really?

Is this any different to many other games?

Is it worth paying £8 for yet another one-armed bandit, even though the graphics are superb?

Can beliefs and opinions be quantified to produce such amazing precision that a score of 90 percent, 90 percent, 90 percent, and 100 percent, will only be worth four stars, yet 90 percent, 90 percent, 95 percent, and 90 percent, is worth five stars?

It's all in the mind.

Boris Allan

## Puzzle

# Under threat!

### Puzzle No 52

King Paramount of Primordia was in a fix! The northern border was under threat again from the neighbouring King Grabbsen, so Paramount was preparing to send his forces north.

Said the idle King, "We'll soon wipe the smile off their faces. We have ten regiments, each with the same number of men, and I will send them off over a ten-day period so that they will arrive at the border at daily intervals."

"Beware — there must always be a prime number of men at the border", announced Proctalgia, the soothsayer. "It's in the stars!"

The King called together all the learned men, but none could agree what was to be done.

"It's really quite easy," declared Nausia, the King's eldest daughter. "All you need to do is withhold a few men from the first company that goes north. This gives a prime number. Thereafter, you can send each entire company and on every subsequent day the total number of men at the border will be prime." She was right, of course. But then she knew how many soldiers there were. Can you work it out?

### Solution to Puzzle No 47

The problem requires you to find two consecutive numbers in the range 1 — 1000, which, if placed to make a single number would equal a perfect square. As the problem relates to a book whose pages have even numbers in the left-hand page, we start with the lowest value (P) and increment by 2 each step.

10 FOR P = 2 TO 998 STEP 2 20 LET Q = P + 1 30 LET PS = (STR\$ P) + (STR\$ Q) 40 LET R = VAL PS 50 LET S = VAL STR\$ (SQR R) 60 IF S = INT S THEN PRINT R;"":S 70 NEXT P

Apart from pages 328 and 329 the only other spread with the property is 528 and 529 — the square of 727. There are also two other pairs of adjacent pages which, together, form a square, but neither are on facing pages: 183 and 184 and 715 and 716.

### Winner of Puzzle No 47

The winner is: Ukachi Opara, Kingsdale Gardens, London W11, who receives £10.

## Top 10

- Atari**
- (4) Defender (Atari\*)
  - (1) Penetrator (Broderbund\*)
  - (2) Chop Lifter (First Star!\*)
  - (5) Astro Chase (DataSoft\*)
  - (1) Zaxxon (Adventure International)
  - (7) Eliminator (Atari\*)
  - (8) Pac-Man (Atari\*)
  - (3) Preppie (Adventure International)
  - (1) Soccer (Thorn EMI\*)
  - (9) Canyon Climber (DataSoft\*)
  - (10) Missile Command (Atari\*)

\*Cartridge, †32K cassette.

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

- Spectrum**
- (1) Penetrator (Melbourne House\*)
  - (4) The Hobbit (Melbourne House\*)
  - (3) Cyber Rats (DK Tronics\*)
  - (5) Do Not Pass Go (Workforce\*)
  - (2) Galaxians (Artic)
  - (6) Orbiter (Silversoft\*)
  - (9) Assembler Editor (Picturesque\*)
  - (8) Mac Martha (Mikrogen\*)
  - (1) Time Gate (Quicksilver\*)
  - (9) Frogger (A+F\*)

\*Requires 48K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

- Books**
- (3) Enter the Dragon, Carter (Melbourne House)
  - (2) Spectrum Machine Language for the Absolute Beginner, Tang (Melbourne House)
  - (1) Assembly Language Programming for the BBC Micro, Birnbaum (Macmillan)
  - (7) Computer's First Book of Vic, various authors (Computer)
  - (6) Programming the 6502, Zaks (Sydex)
  - (1) The Power of the Dragon, Sharp (Microsource)
  - (4) The BBC Micro — An Expert Guide, James (Granada)
  - (1) Lynx Computing, Sinclair (Granada)
  - (9) Programming the 6809, Zaks (Sydex)
  - (1) Wordstar Made Easy, Ettlin (Osbourne)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

- Dragon**
- (1) Donkey King (Microdeal\*)
  - (3) Dragon Trek (Salamander\*)
  - (2) Caterpillar Attack (Microdeal\*)
  - (4) Planet Invasion (Microdeal\*)
  - (6) Space Race (Compuserve)
  - (5) Champions (Peaksoft\*)
  - (10) Wizard War (Salamander\*)
  - (9) Pmania (Automata\*)
  - (7) Attack (PSS)
  - (10) Cosmic Zap (Microdeal\*)

(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

(Last week's positions in brackets)

## Top 10

- Vic20**
- (1) Grid Runner (Llamosoft\*)
  - (2) Lazer Zone (Llamosoft\*)
  - (1) Abductor (Llamosoft\*)
  - (4) Space Freaks (Rabbit\*)
  - (5) Shark Attack (Romik\*)
  - (6) Traxx (Commodore\*)
  - (10) Road Race (Commodore\*)
  - (8) Alien (Commodore\*)
  - (9) Avenger (Rabbit\*)
  - (4) Colonel's House (Rabbit\*)

(Figures compiled by Vic Centre, London 01-992 9904)

- ZX81\***
- (1) Flight Simulation (Pson)
  - (9) Gulp 2 (Campbell Systems)
  - (2) Black Crystal (Carnel)
  - (4) Galaxians (Artic)
  - (6) Do Not Pass Go (Workforce)
  - (3) 3D Monster Maze (JK Greye)
  - (1) Sea War (Panda)
  - (10) Chess II (Artic)
  - (1) Fantastic Voyage (Folcode)
  - (3) Kong Dracula (Tony Roberts)

\*All 16K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

- BBC\***
- (1) Graphs and Charts (Acornsoft)
  - (6) Creative Graphics (Acornsoft)
  - (3) Snapper (Acornsoft)
  - (4) Chess (Program Power)
  - (8) Chess (Computer Concepts)
  - (1) Home Finance (BBCI)
  - (6) Castle of Riddles (Acornsoft)
  - (1) Golf (Bug-Byte)
  - (1) Pharaoh's Quest (Acornsoft)
  - (4) Alchemist Action (Acornsoft)

\*All Model B except marked. †Both Models A and B.

(Figures compiled by Micro Management, Ipswich 0473 59181)



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 "Nothing to get eggscited about, I  
 failed to see the yolk" (Ivor Headache)  
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 we have produced since closing time"  
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 any senseless killing — I'll smash  
 yer faces in!" (A. Hitler)

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 as soon as he's qualified" (S. Spielberg)  
 "Thanks for the free sample, I  
 demand my money back" (C. Sinclair)  
 "This game encourages peace and  
 love — I doubt if anyone will buy  
 it." (M. Ghandi)  
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(how was that boss?)  
 ...LURCH! get 'im!

